GRAIN PRODUCTION AND UTILISATION IN RUSSIA AND THE USSR BEFORE COLLECTIVISATION

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Thesis submitted for the
degree of Doctor of Philosophy
in the Faculty of Commerce and
Social Science, University of
Birmingham.

May 1980

VOLUME I

UNIVERSITY OF
BIRMINGHAM

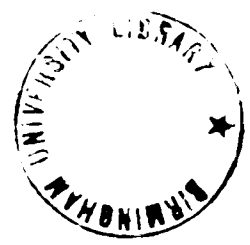
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Synopsis

Grain production and utilisation in Russia and the USSR before Collectivisation

Stephen G. Wheatcroft

This thesis is concerned with analysing the available data on grain production and its utilisation from the time when the earliest grain statistics became available in pre-revolutionary Russia until the eve of mass transformation of Soviet agriculture that was associated with mass collectivisation in 1929. The pre-revolutionary period and post revolutionary period are treated separately in two separate parts of the thesis. In each part I describe the methods of collecting and organising statistics related to the production and utilisation of grain. I discuss the circumstances in which these statistics were gathered and I attempt to assess the reliability of these data and place them in a more meaningful and more comparative form.

I then present an account of the available works that have attempted to analyse the balance of grain production and its utilisation. I conclude by making my own assessment of the balance and compare it with the general conceptions held on the nature of the grain problem. I conclude that the balance of grain production and utilisation was a highly complex phenomenon dependent upon the inter-relationship of demographic, economic and agronomic factors that differed from region to region and from time to time. The full complexity of these inter-relationships was little understood by the political leadership of the time.

Acknowledgements

I owe a large debt of gratitude to many people. To my colleagues and friends at the Centre for Russian and East European Studies at Birmingham I am indebted for their patience, perseverance and help in listening to a mind struggling to find expression for its thoughts. I am especially grateful to John Barber. I was particularly fortunate in being able to study in the Soviet Union on several occasions, under the joint auspices of the British Council, the Soviet Ministry of Higher Education and the Soviet Academy of Sciences. I will for ever be grateful for the friendship and assistance given to me by the staff and students of the Department of Trade Economics of the Moscow Institute of National Economics (the Plekhanov Institute), The Sector of the Socialist Transformation of the Soviet Countryside, of the Institute of History of the Soviet Academy of Sciences, and of the Department of the History of the USSR in Moscow State University. I am particularly grateful to my Soviet supervisors Professor P.V. Pirogov, Professor V.P. Danilov and Professor V.M. Selunskaya, and to the many Soviet academics who freely made themselves available for consultation, particularly to Professor A.M. Anfimov and Corresponding Member of the Academy of Sciences Yu.A. Polyakov of the Institute of History of the Academy of Sciences, to Yu.A. Moshkov of the Moscow State University and to I.A. Chemerissky of the Moscow Public History Library. My largest debt is to my supervisor at the Centre for Russian and East European Studies at Birmingham, Professor R.W. Davies. His patience and guidance have assisted me throughout my lengthy trials writing this thesis. My interest in studying the views on grain output and the conflict between different economic agencies was a direct response to this guidance.

I owe a particular debt of gratitude to the many secretaries who have slaved away over a mass of statistical tables. And particularly to Olga Griffin and Judy Francis who had the additional burden of having to work with me during the final stages of putting this thesis and tables together.

It is no exaggeration to say that without their assistance the completion of this work would not have seen the light of day.

The final responsibilities for the judgements made in this work and for any errors of fact and interpretation are mine alone.

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Introduction

The nature of the grain problem and the way in which it was resolved are generally acknowledged as having the greatest significance for the economic and political history of the Soviet Union. Yet there remains considerable uncertainty as to what exactly the grain problem was and what caused it. Stalin and his colleagues had no such doubts as to what they thought the nature of the grain problem was. The subsequent path of Soviet agricultural history and Soviet society as a whole has been to a large extent conditioned by how Stalin saw the problem and how he saw the solution. In order to appreciate the rationality of Stalin's solution it is necessary to accept his conception of the problem. This conception of the problem was forced upon Soviet society and has taken a very strong hold of many of the best western conceptions of the problem, but it has been challenged by historians both in the Soviet Union and in the West. In its time in the mid and late 1920s it was far from being the only or the best analysis of the problem[1]; it was, however, the most politically influential. It is natural that the view of the victors be given significance; after all they won. But it is a mistake to consider that they won because their analysis was correct or the most appropriate. Stalin's interpretation was accepted because of his political dominance which unfortunately was based on other things than the quality of his analysis of this problem.

The best presentation of the Stalin conception of the grain problem came in the published extracts of Stalin's talk with the students of the

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1. Here I differ strongly with the late Professor Karcz who described Stalin's analysis as 'the first attempt at the quantification of the grain problem', J.Karcz, 'Thoughts on the grain problem', Soviet Studies, April 1967, p.401. (My emphasis).

Institute of Red Professors, the Communist Academy and the Sverdlov University on May 28, 1928 in 'On the grain front'[1]. In this work Stalin claimed that even though the pre-war level of grain sown area and grain production had been reached the amount of grain produced for the market was only a half, and the amount exported only about one-twentieth of what it had been in the pre-war period. While initially admitting that 'faulty planning and mistakes in economic coordination have played a considerable part', he went on to consider this as superficial, and stated that the underlying cause is 'primarily and chiefly the change in the structure of our agriculture brought about by the October Revolution, the change from large-scale pomeshchik (landowner) and large-scale kulak farming, which provided the largest proportion of marketed grain, to small and middle peasant farming, which provides the smallest proportion of marketed grain.'

The following famous table was then presented to illustrate the change in structure of grain production and grain marketings (see over page).

From this Stalin argued that a shift to large scale, preferably socialised farming was therefore needed to increase the commodity nature of grain production to ensure the needed supplies for urban consumers, industry and export.

Such a transformation was achieved with the move to mass collectivisation that began in the autumn of 1929.

In the Soviet Union in 1928 and early 1929 nearly every aspect of Stalin's interpretation was challenged by economists and statisticians. The statisticians challenged that the harvest was as high as Stalin had

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1. See I.V.Stalin, Sochineniya, M.1949, Tom II, pp.81-97.

Period	Gross grain production mln.tons	%	Marketed grain (extra-rural) mln.tons	%	% of marketed grain
Pre-war Pomeshchik (landowners)	9.8	12%	4.6	21.6%	47%
Kulaks (rich peasants	31.1	38%	10.6	50%	34%
Middle and poor peasants	41.0	50%	6.0	28.4%	14.7%
Total	81.9	100%	21.3	100%	26%
1926/27 State and collective farms	1.3	1.7%	0.6	6%	47.2%
Kulaks	10.1	13%	2.1	20%	20%
Middle and poor peasants	66.4	85.3%	7.6	74%	11.2%
Total	77.8	100%	10.3	100%	13.3%

Source: I.V.Stalin, Sochineniya, M.1949, Tom 11, p.85.

Note: The figures have been converted from millions of puds into the more familiar millions of tons. (1 ton = 0.01638 pds) These figures are sometimes referred to as the Stalin/Nemchinov figures.

claimed it to be[1]. Many agricultural experts, particularly those concerned with the livestock industry emphasised the progressive developments within Soviet agriculture as it was becoming more intensive[2]. The trade experts continued to emphasise the complexity of the measurements of marketings. The production-organisation school of agricultural economists were repeatedly

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1. In July 1928, Osinsky who had just been removed from the directorship of TsSU (in March) challenged the current official evaluations of the grain sown area at a central committee plenum and incurred Stalin's displeasure for it. See E.H.Carr and R.W.Davies, Foundations of a planned economy 1926-1929, Vol.1, pp.76-8, (citing from the Trotsky archives). See also S.G.Wheatcroft, 'Views on grain output, agricultural reality and planning in the Soviet Union in the 1920s', M.Soc.Sci.thesis, Birmingham 1974, pp.108-10.

2. See in particular articles by V.Drozdov, Ekon.Zhizn., 28/12/1927, p.2, Voprosy torgovly, 1928, no.7, p.24.

emphasising the problems involved in applying a crude socio-economic differentiation of the peasantry. And Vainshtein, Urlanis and Bogoslovsky directly challenged Stalin's account of the splintering of the peasant households and their increase in numbers[1].

However, by the end of 1929 when the political opposition to Stalin was smashed, the statisticians and economists were easily suppressed and silenced. From then on the Stalinist conception of the grain problem was the only one allowed in the Soviet Union.

With the end of the cult of the personality, Soviet historians have become more critical of this conception.

Danilov, while keeping strictly within the bounds of the orthodox conception[2], noting that the splitting of productive forces had a negative effect on the development of agriculture, delaying its increase and transition to a higher technical base, nevertheless warns against the tendency to exaggerate the degree of splintering[3].

In 1968 Gazalova published a work specifically analysing the splintering of peasant households in European Russia 1921-1929 which emphasised the positive effects of the redistribution of land[4]. In the following year I.A. Chemerissky at a Conference of Soviet Agrarian historians noted the great inadequacies of work on analysing the economic consequences of the revolution and redistribution of land in 1917-21. He specifically cited the earlier works of Vainshtein, Urlanis and

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1. See A.Vainshtein, 'Chislennost i dinamika krestyanskikh dvorov', SO., 1929, no.7, p.11. D.Bogoslovsky, 'Razmer semy i chislo krestyanskikh khozyaistv', SO, 1929, no.9, pp.29-36.
2. V.P.Danilov, Sozdaniye materialno-tekhnicheskikh predposilok kollektivizatsii selskogo khozyaistva v SSSR, M.1957, pp.25-6.
3. V.P.Danilov, ibid., p.26.
4. See K.M.Gazalova, 'Statisticheskiye istochniki odroblenii krestyanskikh khozyaistv v Evropyeiskoi Rossii v 1921-1929gg.', in Istochnikovedeniye istorii Sovetskogo obshchestva, vyp.2,M.1968, pp.265-95.

Bogoslovsky, noting that no-one had given an adequate reply to these articles, but then he added rather wistfully, no-one had paid any attention to them[1].

In 1966 Yu.A.Moshkov produced a detailed study of the grain problem in the years of collectivisation[2] but in his introductory chapter on the emergence of the grain problem in the USSR, Moshkov reproduces the standard Stalin explanation with no modification[3]. The Soviet economist A.A.Barsov on the other hand was most scathing about this argument in his book the following year on the balance between urban and rural value exchanges[4]. Barsov argued that the difference in commodity production between the large pomeshchik estates and the peasantry at large was not so much due to the increased yields of the former, because they were not so much higher, but rather to the greater exploitation of their peasant labourers and to their greater allocation of land. Barsov therefore argued that the dispersal of the pomeshchik lands in itself would have provided the basis for increased peasant production. The real reason for the decrease in commodity share of grain produced in the 1920s was not so much the liquidation of large scale production but an increase in peasant consumption once the exploiting classes had been removed.

In the West, Maurice Dobb accepted the Stalin interpretation completely[5].

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1. I.A.Chemerissky, 'Vliyaniye agrarnoi revolyutsii 1918-1918 gg. na sel. khoz.proizvodstvo v SSSR', in Problemy Agrarnoi Istorii Sovetskogo Obshchestva, M.1971, p.70.

2. Yu.A.Moshkov, Zernovaya problema v gody sploshnoi kollektivizatsii sel.khoz.SSSR (1929-1932gg). M.1966.

3. See Yu.A.Moshkov, ibid., pp.23-5.

4. See A.A.Barsov, Balans stoimostnykh obmenov mezhdu gorodom i derevnyei, M.1969, pp.22-3.

5. 'With his strong instinct for essentials, Stalin early in 1928 emphasised that the fundamental reason was to be sought in the very character of the agrarian revolution of 1917'. M.Dobb, Soviet economic development since 1917, p.216. (First published 1948, quoted here from 6th revised edition). The Stalin-Nemchinov table is reproduced on p.217.

And in his 1958 volume on 'Socialism in One Country', Carr accepted in principle the main features of the Stalin interpretation. Carr argues that the peasants farming 'midget holdings' were struggling to extract a bare subsistence from the soil before Stolypin and that the Revolution 'restored cultivation for subsistence and offered no adequate incentives for production for the market'[1]. He sums up by stating 'Nothing seemed to have been settled by the Revolution, theproblem had once again to be faced from the beginning'[2]. From this position collectivisation appears almost inevitable.

In the later volume 'Foundations of a planned Economy' the Nemchinov Stalin figures are considered critically for the first time[3], but nothing is mentioned to qualify the overall assessment of the agricultural picture made in'Socialism in One Country', which appears to rely so heavily on Stalin's 'On the grain front' analysis.

Professor Nove in his Economic History, similarly accepts the negative influence of the agrarian revolution on the grain problem[4]. But Professor Lewin was far more cautious in noting that'since the Revolution they (the peasants) had not yet had sufficient opportunity to determine what real advantages it had to offer'[5]. In 1967, however, Professor Jerzy Karcz launched an attack on the traditional Stalin conception of the problem, describing it as 'completely misleading' and providing 'an exceedingly distorted picture'[6]. Professor Davies subsequently pointed out that

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1. See E.H.Carr, Socialism in One Country, vol.1 p.229
2. See E.H.Carr, ibid., p.230
3. See E.H.Carr and R.W.Davies, Foundations of a planned economy 1926-1929, volume 1, part 2, pp.916-9.
4. 'The effect of the revolution (agrarian) was, in a technical sense, reactionary', Alec Nove, An Economic History of the USSR, p.106.
5. M.Lewin, Russian peasants and Soviet power, p.37.
6. J.Karcz, 'Thoughts on the grain problem', Soviet Studies, April 1967, No.4, p.403.

although the Stalin conception of the problem may well be somewhat misleading and distorted, it was not as 'completely misleading', as 'exceedingly distorted' and as 'magnificent a Stalinist hoax', as Professor Karcz was claiming[1]. Professor Karcz subsequently admitted that he had somewhat overstated his case[2] and both Professor Davies and Professor Karcz were in agreement that more work was needed in order to analyse exactly what the grain problem was[3].

Since this time social and political historians, in particular Professor Lewin, have described the way in which the alleged problem was resolved by the organised 'taking' of the grain'. All of this subsequent work goes beyond the grain problem of the mid 1920s but to some extent is based upon assumptions concerning it. Clearly the need for a full scale reassessment of the basis of the grain problem is more urgent than ever.

This thesis is aimed at being a contribution to such a reassessment.

The thesis presents a detailed analysis of all the available data on grain production and utilisation from the earliest available grain statistics in the pre-revolutionary period , through the first decade of Soviet power and up to the year of the great mass transformation of the Soviet countryside in 1929. It pays particular attention to the question of how these grain statistics were constructed and attempts to assess the reliability of these data. It also regroups much of the data into more comparable units and regions in order to carry through the analysis over a more lengthy period

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1. R.W.Davies, 'A note on grain statistics', Soviet Studies, January 1970, No.3, pp.314-29.
2. 'The likelihood is still that a comparison was made between incomparable magnitudes, though the difference between these magnitudes is much smaller than I believed it to be in "Thoughts"'. J.Karcz, 'Back on the grain front', Soviet Studies, October 1970, no.2, p.291.
3. Professor Karcz was himself intending to work on this problem, before his untimely death.

and on a more detailed plane than is otherwise available.

The thesis is in two parts and contains a detailed appendix. Part One concerns the pre-revolutionary period including the pre-October 1917 war years. Part Two concerns the post-revolutionary period from 1918 - 1929. The appendix contains much of the original data on grain production and elements related to grain consumption and utilisation, i.e. population data, livestock data and transportation data.

Part One begins with a chapter (1) on the organisation of pre-revolutionary grain statistics. This is followed by a chapter (2) that compares the indications from the different types of data and assesses their reliability. The third chapter (3) presents an account of the available utilisation and transportation data. Each element within utilisation is treated separately. Separate sections being allocated for a) seed use, b) personal consumption, c) livestock feed, d) industrial use, e) military use, f) stock changes, g) exports, h) losses and i) on transportation. Within each section I consider the available data concerning the utilisation of grain by each of these elements. I describe how the data were collected, discuss their reliability and present an account of the general changes in its level over time, where that is possible to ascertain. The fourth chapter (4) presents the available data on grain production, presents my own regroupings of these data and analyses them. The fifth chapter (5) reviews the available grain utilisation balances that have been drawn up for this period and analyses them. Chapter six (6) presents a summary of the conclusions on this part of the thesis.

Part Two of the thesis has roughly the same pattern only with considerably more attention being given to the complex and changing methods of evaluating sown area and yield. Chapter One presents a general account of the setting up and organisation of the new Soviet Central Statistical

Administration (TsSU) and the problems it faced in making its evaluations. The internal conflicts between the statisticians are described and the influence of political factors on their action is also briefly described[1]. Chapter Two (2) considers how the data on grain sown area w collected, processed and adjusted. It presents an account of the available data and comments on their reliability. Chapter Three (3) carries out a similar analysis of the grain yield data and results. Chapter Four (4) is concerned with data on grain production, but since the analysis of yield and sown area have been carried out separately this chapter is relatively short and is mainly concerned with the presentation and analysis of the available data. Chapter five (5) presents an account of the available utilisation and transportation data by separate elements and is directly analogous to chapter three of Part One. Chapter Six (6) reviews and analyses the available grain utilisation balances. Chapter Seven (7) presents the conclusions to this chapter.

A very brief section on general conclusions completes the thesis.

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1. This has been dealt with at more length in my earlier work, See S.G.Wheatcroft, 'Views on grain output, agricultural reality and planning in the Soviet Union in the 1920s', Birmingham, 1974, M.Soc.Sci. thesis.

Part One: Grain production and utilisation in Russia before 1918

1. The organisation and collection of grain statistics.

In comparison with later periods the organisation of grain statistics in this period was relatively simple and straightforward. I will deal first with grain production statistics, which were the most traditional and well developed. Later I will discuss what few grain utilisation statistical data were available for this period.

a) Grain production statistics before the First World War

Grain production statistics had not been used for major fiscal purposes since well before the reign of Peter the Great[1], and so the peasants were quite used to supplying the administration with grain statistics without there being any apparent disadvantage to themselves. This situation and the peasant appreciation of it only gradually began to change during the late stages of the First World War. Until the introduction of the grain levy the peasants had little incentive to conceal their real level of production and similarly the statisticians and local agents who collected and worked out these statistical materials were under little pressure to distort the level of production one way or another. We should not therefore expect a large degree of underestimation at this time. There were differences in the scale of evaluation between the different agencies making these calculations, but these were based primarily upon technical aspects of how these different agencies collected their data,

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1. The very earliest Russian State statistics on land and its produce go back to 'Pistovye knigi' (the cadastral surveys used for collecting Tatar tribute in the thirteenth century). These were very similar to the English Doomsday Book. Surveys were repeated for taxation purposes at infrequent periods until the disorders of the beginning of the seventeenth century. Towards the end of the seventeenth century attempts were made to restore the land tax and a new cadastral survey was begun in 1676. However this survey was never completed. It was replaced first by a household tax and then under Peter the Great by a poll tax. For an account of these surveys and taxes see J.Blum, Lord and Peasant in Russia, Princeton, 1961, pp.230-34.

the relative coverage of the different systems of the different agencies, the representativeness of samples, etc. Political and ideological considerations based upon what policy implications or value judgements would be made from the statistics appear to have been far less significant than they were to become later[1].

Although ideology did not play an important role in pre-revolutionary evaluations of grain production, it did paradoxically enough play an important role in the liberal intelligentsia's assessment of the official evaluations of grain production. The liberal Professor A.F.Fortunatov was perhaps the most outspoken and certainly the most frequent critic of the official statistics. But as we will see below much of this criticism was without basis. Part of the authority of Fortunatov's attitude appeared to come from the apparent fact that the central statisticians did not themselves have any faith in their own statistics. Fortunatov cites a distinguished gallery of high officials from the Central Statistical Committee TsSK who all appear to be saying the most damning things about their own statistics. We may thank the Soviet historian Nifontov for tracing most of these quotes to their sources and discovering a curious law of bureaucratic organisations; namely, that new office holders immediately began their term of office by describing how badly their job had been done by their predecessors[2]. As we will see in this section the

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1. We should note that on ideological lines we could have expected the evaluations of the critical zemstva (local government) statisticians to have been less favourable than those made by the TsSK which was attached to the Tsarist Ministry of Internal Affairs. Quite the opposite was the case, indicating I think that ideology was not very important in this case.

2. See A.S.Nifontov, Zernovoye Proizvodstvo Rossii vo vtoroi polovine XIX veka, M.1974, pp.16-20, 25-28

organisation of central state grain statistics in this period was relatively simple, but quite adequate. The sown area data could well have gained by there being more frequent censuses, but were still not all that bad as the 1916 census was to show. And the yield data seem to have been as good as any. Other branches of statistics e.g. livestock and demographic statistics were in a very sorry plight and it is probably true that technical crop statistics were very inadequate. But my conclusions on the question of the reliability of pre-revolutionary grain production statistics are that they were totally adequate, quite accurate and that they were unjustly maligned. These conclusions rest upon the arguments and analysis which follow and not upon the authority of any of the recognised specialists[1].

Grain production statistics in this period were therefore organised in a simple way with few controls. All the different systems relied basically upon peasant assistance and honesty in revealing the level of production sowings and yield to the statisticians and officials who regularly asked him about these things.

If an estate steward or a keen representative of the local administration wanted to be very thorough and check up on the level of production, and especially if he wanted to know in advance what the yield was likely to turn out like he could always carry out for himself trial thrashings (probniye umoloty) as soon as the harvest was ready. This procedure of carrying out trial thrashings or the measurementof the first thrashings probably dates back to the earliest times of organised agriculture and,

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1. Most Western attitudes seem to rest on Jasny's authority. Jasny leans heavily on Groman. Groman and his colleagues in Gosplan seem to have been politically inspired in some of their attitudes and certainly leant heavily on the pre-revolutionary zemstvo tradition of great hostility to central TsSK statistics.

as a recent Soviet historian has pointed out, is recorded in historical documents from at least the seventeenth century[1]. By the second half of the eighteenth century, according to the historian Rubinshtein, the local administration were already carrying out these experimental harvestings and thrashings in order to make a preliminary estimate of the yield[2]. And, by the beginning of the nineteenth century, references to taking trial thrashings were already appearing in official documents as an obligatory, standard operation[3]. By the middle and late nineteenth century, there is much evidence to indicate that trial thrashings were indeed being carried out by agents of the administration throughout the country[4]. The existence of such an established procedure for establishing the preliminary scale of harvest should be borne in mind. There appears to have been little conflict over its use. This is presumably because it was primarily used for making preliminary harvest forecasts; there was no need to use it for correcting grain yield statistics because no-one was systematically attempting to conceal the true level of grain yield.

We will now consider the main sources of statistical material on grain production. There were basically three agencies engaged in collecting statistical materials. First, central state statistics were collected by the agents of the local administration and the police for the Ministry

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1. See A.S.Nifontov, Zernovoye proizvodstvo Rossii vo vtoroi polovinye XIX veka, M.1974, pp.36-37. Nifontov is here citing the accounts of the Morozov estate in the beginning of the 1660s. (Knigi posevniye, uzhinniye i umolotiye v imenii Morozova, in Vremennik Moskovskogo obshchestva istorii i drevnostyei, Kn.7, M.1850, pp.7,10,13,14).
2. N.L.Rubinshtein, Selskoye khozyaistvo Rossii vo vtoroi polovinye XVIII v., M.1957, p.358.
3. See A.S.Nifontov, ibid., p.37 citing PSZ 1, t.XXXVIII, 1822, No. 29025, art.21.
4. See A.S.Nifontov, ibid., pp.37-41, see also N.N.Ulashchik, Otchety gubernatorov Litvyi i Zapadnoi Belorussii kak istoricheskii istochnik (1804-1861), in Problemy istochnik-ovedeniya, kn.IX, M.1961, p.18.

of the Interior, via the Central Statistical Committee (TsSK) once it was formed. Secondly, an alternative series of yield statistics covering a large area of Russia were collected by the Department of Agriculture of the Ministry of State Property, later the Ministry of Agriculture. Thirdly, statistics were gathered by the local government (zemstvo) statistical departments. All these agencies collected statistical materials until at least 1915. In the last two pre-revolutionary years there were considerable changes as the agencies of the central administration collapsed and the agencies of the local government offices and the Ministry of Agriculture expanded. The organisation of statistics in this complex, revolutionary sub-period will be dealt with separately after I have discussed the pre-war period.

(i) Statistics of Ministry of Internal Affairs

The main drive behind collecting central state statistics had been the wish of the Tsarist Ministry of Internal Affairs (MVD) to be acquainted with the factor likely to be the most decisive in fermenting unrest. This of course was the state of the harvest. Ever since Peter the Great had reformed local government and created a network of local Governors in charge of the different gubernii into which the country was divided, it had been one of the tasks of the Provincial Governor to send an annual report to the Emperor on the condition of his gubernia. These reports had always included an account of the state of agriculture in the gubernii. But when the Ministry of the Interior was formed in 1802 the provincial governors were requested to present statistical materials on the state of agriculture and in particular an indication of the level of the yield of the major grains. From this time the Ministry began employing officials (at first only 10) to systematically collect and sort this material[1].

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1. See A.I.Gozulov, Ocherky istorii otechestvennoi statistiki, M.1972, pp.52-54, N.A.Kablukov, Kurs Statistiki, M.1911, pp.64-67.

This is the source of the materials cited by Mikhailovsky, Fortunatov, Kovalchenko and Nifontov, that will be described below.

For administrative purposes the country was divided into gubernii, uezds and volosts. By 1917 there were 101 gubernii in the Russian Empire, each gubernia having on average a population of about 1.7 million. Each gubernia was split into about 8 uezds and each uezd into about 20 volosts. The volost therefore had an average population of about 10,000. Below the volost level the peasants were subjected to their own traditional form of local administration based on their representation in the rural societies (selskiye obshchestva). There were on average 10 rural societies within each volost covering about 35 villages or separate population points.

At first no special administration was provided for collection of these statistics. Only in 1835 were Gubernia Statistical Committees (GSK) set up to administer the collection of statistical data at the gubernia level. These committees were presided over by the local Governor. Its members included the heads of all the appropriate gubernia organisations. Local inhabitants with special knowledge of statistics could be co-opted. Each committee also had one secretary, who was the only person with full time responsibility for carrying out the statistical work[1]. Intermediary between GSK and the volost officials was another commission formed at the uezd level. This was called the Commission of National Food Supply (Kommissiya narodnogo prodovolstviya) (KNP) and varied in its activities according to the time and the inclination of the local gentry. It was presided over by the Marshal of the Nobility for that uezd and had as its members local officials from the

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1. N.A.Kablukov, Kurs Statistiki, M.1911, pp.66-67.

Ministry of State Property and elsewhere and some other persons.

In 1857 a Central Statistical Committee (TsSK) was formed to co-ordinate, oversee and check the work of the GSKs and collect homogeneous empire-wide data. The first Director of TsSK was the very able statistician P.P.Semyonov. Soon after the formation of this professional committee a new super-supervisory council was formed to tighten authoritarian control in these matters. This was the Statistical Soviet formed in 1863. The chairman of the Soviet was appointed directly by the Tsar, and the members included : the Director of TsSK, senior editors of TsSK, various academics and the representatives of the Ministry of the Interior. At first this Soviet was given the ultimate supervisory and planning control over all statistical investigations. However this was changed somewhat after 1875 when its powers were limited to the supervising of central state statistics. This allowed the zemstva to develop their statistical organs, but as will be explained below considerable power was still to be exercised over the zemstvo statistical agencies by the local governors and the MVD.

At first under Semyonov's leadership TsSK was able to progress and develop its statistical work. Later in more reationary times it was to suffer the stagnation and bureaucratisation characteristic of the whole Tsarist state,

In 1864 and 1865 the TsSK worked out harvest statistics for the period 1860-64 from the data of GSKs. But Semyonov decided that their reliability was so suspect that the results were not even worth publishing. In the first issue of a TsSK journal[1] Semyonov stated his conviction that it was essential to drastically reform the means of collecting these

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1. Vremennik TsSK no.1, 1866, p.xxiii.

harvest statistics: production should no longer be ascertained by allowing local agencies to estimate gross production using their own resources and own methods. Instead, a full and accurate census of sown area of all grain cultures every five years should be accompanied by the collection of annual data on average yields per desyatina (1 desyatina = 1.093 hectares) via special forms distributed annually to a representative section of householders[1]

However, Semyonov's proposal was not implemented at the time. It was fourteen years later, after the serious harvest failure of 1880 in the Central and Lower Volga regions that the government and MVD began to look specifically into the problem of improving the quality of grain statistics. A special commission under Senator Bippen was given the task of working out a plan of organising harvest statistics on the basis of Semyonov's suggestion[2]. But, instead of a census of sown area every five years,as originally proposed by Semyonov, a full census of all land (ugodya) was held for 1881 and 1887[3], and from 1893 there was a move to taking an annual registration. This registration covered all cultivated crops and also areas under hay (including water and other meadows). The gathering of these data was timed to occur at the moment of the finishing of the spring sowings. For the private lands the local police officials circulated and collected a questionnaire; for the peasant lands the volost authorities either did the rounds themselves and questioned each household or they called upon the services of the village elders to do much of this

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1. See also V.E.Den, Kurs Ekonomicheskoi Geografii, M.1926, Vinogradova in V.S. 1925, no.10-17, p.37.
2. See Vinogradova in V.S. 1925 no.10-12, p.38
3. See Vinogradova in V.E.Den & B.I.Karpenko (eds.) Khozyaistvennaya Statistika SSSR, L.1930, p.63

for them. The data then passed on to GSK, with a copy to KNP. Data on sown area were officially collected in this way up till 1915.

Data on yields were collected by questionnaire. Every year TsSK allocated 12 questionnaires for the peasants to each volost, six for winter crops, and six for spring crops. As with sown area, these were distributed for the peasant lands by the volost authorities and for the private lands by the local police officials. Initially both sets of yield data passed to TsSK through GSKs; after 1894 the volost authorities sent the peasant replies directly to TsSK[1]. Copies were presumably sent later to KNP and GSK.

The area covered by these questionnaires substantially expanded between 1881 and 1907. In 1881-88 they covered only the 50 gubernii of European Russia. In 1888-90 the 10 gubernii of Privislinia (i.e. the Polish and Baltic Provinces) were added, and in 1892 North Caucasia. This brought the total to 64 gubernii, this covered the whole European Territory of the Empire. In 1895 the 4 gubernii of Western Siberia and the Steppe regions were added, and between 1904 and 1907 Transcaucasia, Central Asia and Eastern Siberia. From 1907 the figures included 92 out of the 93 gubernii of the former Empire; only Kamchatka gubernia was excluded, an area of no agricultural significance. The coverage of crops also increased. In 1881-88 the questionnaires covered Winter and Spring Rye, Winter and Spring Wheat, Oats, Barley, Millet, Maize, Buckwheat and Spelt; after 1888 Flax, Hemp and Hay were included; from 1889 there were different classifications for Water Meadows and Plain Meadows and for Straw from each grain; after 1893 Beans and Lentils were also included; from 1905 Rice and Cotton and from 1912 Sunflowers

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1. M.A. Sirinov, *Ocherki po agrarnoi statistikye*, M.1923, p.509

were also added[1].

From 1903 TsSK also began to collect data about the conditions of the crop during the growing period. Data were used to calculate the probable gross production of grain, which was known by the end of July or the beginning of August. It was collected by the same mechanism used to collect the data of the factual harvest, but much earlier. The householder gave his own subjective evaluation of the size of the crop. This evaluation was made on the basis of several systems, the most common of which was a five point scale (Point 5: excellent, Point 4: fine, Point 3: normal, Point 2: just below average and Point 1: bad). To translate these evaluations into factual yields the following conversions were used: - point 3 (normal) equals the average factual yield for the past ten years. For other points one or two times a third of this average was added or subtracted as the case required[2]. Yields were measured in puds per desyatina (1 pud per desyatina = 0.164 tsentners per hectare).

It should be noted that the yields data, unlike sown area data, were not a full registration, but only a sample survey. Initially apparently a sample of only 6 households (3 peasant and 3 landowner) per volost was taken. Later the number was doubled, but still remained very low, roughly at a level of 12 reports per volost, 114 reports per uezd, or about 60,000 reports for all the Empire[3].

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1. Data on coverage from Vinogradova, in V.E.Den & B.I. Karpenko (eds.), Khozyaistvennaya Statistika SSSR, L.1930, p.71

2. After the Revolution these data were used by the Scientific Methodological Department of TsSU to provide a scale for the conversion of correspondents subjective reports of the yield on a five point scale to actual yield. In the uncertain times of grain production after the Revolution this was a very useful piece of control data. (See section below on post-revolutionary statistics of grain output and corrections applied to it).

3. See M.A.Sirinov, ibid., M.1923, p.505.

The local authorities were charged with ensuring that the lists were distributed throughout their area as evenly as possible and in such a way that the replies were reliably and responsibly filled in. But at the same time official sources emphasised that the role of the administration in collecting was only that of an intermediary between the producer and the TsSK. [In circulating these questionnaires the lower organs of administration were held to be acting not as organs of investigation; it was claimed they were only acting as a distribution mechanism] The head of the household himself, or the village elder (starosta), had to fill in the sheets himself in a concrete manner after the harvest. Consequently it was claimed that there was no guesswork involved; only the absolute data were being recorded.

Later analysis calls into question this official account of how the collection was made. Vinogradova[1] notes that the volost authorities also had to produce their harvest accounts for inclusion in the governors' annual report. She suggests that as they were overworked many of the replies did not come from the producers at all but were estimated by volost officials who filled in the forms themselves. In the first publication of the new grain statistics this certainly occurred. In the introduction to the first statistical handbook devoted to grain statistics under the new system TsSK itself complains about this[2]. Moreover, according to Vinogradova, the absence of such criticisms in later works of TsSK does not so much reflect a change in the pattern of the work of the local authorities as a decline in the critical faculties of TsSK; we could add that it may also be the case that with practice

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1. N.M.Vinogradova, V.S. 1925, no.10-17,pp.37-38.
2. 'Urozhai 1883', SPb 1884, Introduction p.6.

the local clerks filled in the forms less crudely! Vinogradova, who analysed some of the 1916 returns herself, claims that nevertheless there are clear signs in many cases that they have been fabricated, and many of them produced by the same person.

(ii) Ministry of Agriculture grain production statistics

The Department of Agriculture of the Ministry of State Property also had a long involvement in the working out and aggregation of local grain production statistics, predating the formation of TsSK under the MVD. As early as 1851, I.Vilson of the Department of Agriculture had compiled the first detailed compendium to the Department's Economic-Statistical Atlas of European Russia. By 1869 the fourth edition had appeared[1]. This was a very detailed (523 page) collection of data. 'The sole source' of data on grain production used in these volumes was described as being 'the data collected by the Commissions of National Food Supply (KNP) that were presented in the Governors' Annual Report.' Even after the creation of TsSK, Vilson still emphasized the independent access of the Department of Agriculture to these data.

The figures given in this early Department of Agriculture source covered the main winter and spring grains in 49 provinces of European Russia. As already noted above, although TsSK had worked out national figures for 1860-64, it refused to publish them. These early figures of the Department of Agriculture, covering 1857-63 in the fourth edition of the compendium were consequently the only aggregated figures available at the time.[2]

In 1880, at the time that TsSK put the organisation of their

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1. Obyasneniya k khozyaistvenno-statisticheskomu atlasu evropyeiskoi Rossii, izd.4, SPb.1869. This fourth edition is the only one that I have been able to consult.

2. Obyasneniya....., izd.4, SPb., 1869, p.75.

grain production statistics on a more organised footing and began the regular publication of these statistics, the Department of Agriculture also began collecting and producing its own grain production statistics. The Department of Agriculture had no machinery for collecting statistics of sown area, and so they had to use the data of the TsSK. In collecting its yield data, the Department, unlike TsSK, used a network of voluntary correspondents. In this respect it copied the American, English and German systems, as it readily acknowledged[1]. These correspondents were in most cases farmers themselves; (in the early years they were overwhelmingly landowners, not peasants). The yield on their own farms was universally acknowledged as being higher than average because they were more literate and tended to be more progressive in their farming techniques. This was counteracted to some extent because they also reported on the yields of their less progressive neighbours. But undoubtedly the major drawbacks of the Department's system of gathering yield statistics was the untypical sample, the small size of the correspondence network and their unlevel distribution throughout the country. The following table shows the size of the network and how it developed:

Year	Absolute No. of correspondents	No. of correspondents per uezd	No. of correspondents per volost
1881-85	2,600	5	0.27
1886-90	3,000	6	0.32
1891-95	5,600	11	0.59
1896-1900	6,900	14	0.75
1901-08	6,949	14	0.75
1913	8,486	17	0.91

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1. Svod Statisticheskikh Svedinii po Sel.Khoz.Rossii k kontsu XIX veka, SPb 1902, p.IX.

Sources: Numbers of correspondents for 1881-85/1896-1900 from Svod.Stat.Svedenii SPb. 1902 p. X and N.M. Vinogradova V.S. 1925 No.10/12 p.39.

Numbers of correspondents for 1901-08 from D.N. Ivantsov, K Kritike Urozhainoi Statistiki, SPb 1915, p.54 and N.M.Vinogradova, ibid., 1925, p.39.

Numbers of correspondents for 1913 from V.E.Den, Istochniki vazhneishikh otraslei Ekon.Stat. v SSSR, L.1926, p.34

I have assumed that there were 504 uezds and 19 volosts per uezd.

The correspondents were spread extremely irregularly between uezds (the year concerned is 1900):

No.of correspondents in one uezd	No. of uezds	as %
1-4	55	10.9
5-9	142	28.3
10-14	154	30.7
15-19	65	12.9
20-24	37	7.4
25-29	14	2.8
30-39	15	3.0
40+	20	4.0
	502	100

Source: from Svod Stat.Svedenii SPb.1902, p.X and N.M.Vinogradova, ibid., p.40.

The Department did not use data of those uezds for which it had less than 6-7 correspondents: this was about 20% in 1900, but the percentage fell in later years.

Statistics on yield were collected for three periods. In July, approximate figures were given of the preliminary winter harvest, in the form of a percentage difference from the average yield. In September, the expected results of the winter and spring grain harvests were calculated by means of test thrashings. Finally, in November, the factual

yield was recorded after the full harvest had been completed.

Gross production could be calculated from these figures for yield by multiplying the regional sown area by the regional yields and adding the regional totals. Sown area could be obtained from the TsSK and yield data from the Department of Agriculture where available and from TsSK when no other data were available.

iii) Zemstvo grain production statistics

The Zemstva were formed in 1864 at the gubernia and uezd levels of local administration. They were to act as supplementary agencies of local government. They were particularly concerned with relief work, health, education and agricultural improvements. In the grain surplus areas they also participated in the state purchase of grain for the army[1]. This was a role which was to greatly expand during the war and to cause the zemstvo statisticians to have a central role in organising grain procurements. The Zemstva had played a very important role in organising famine relief in the early 1890s. And this was a role which continued to have importance.

The Zemstvo expenditure on agricultural measures had been fairly minor (less than 3 million roubles a year) before 1900. By 1907 it was still under 5 million roubles, but then it rose extremely rapidly in the immediate prewar years. It reached 16 million roubles in 1913. This dramatic rise in zemstvo agricultural measures was in many respects a reflection of the increased activities and expenditures of the Ministry of Agriculture much of which was channelled through the Zemstvo[2].

As the agricultural work of the Zemstva grew, their need for reliable statistical materials also grew and so did their ability to organise

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1. See section below on grain utilisation by the army. p 160-2
2. See Sel.Khoz. Promysel v Rossii, M.1914, pp.234-44.

their own statistical departments. At first they had relied on the statistics of the central administration. The first Zemstvo statistical collection was published by the Moscow Zemstvo for the year 1869, and only included central official data collected by the TsSK as explained above. But soon the zemstva found these data inadequate and began setting about collecting their own. From the beginning of the 1870s they began to undertake studies of peasant budgets and their own local statistical investigations. Special statistical departments were formed within the Zemstva: Vyatka, Moscow and Chernigov Zemstva led the way, but were soon followed by nearly all the others.

However the collection of grain statistics by the zemstva statisticians only really began in the 1880s after the TsSK and Department of Agriculture had already started organising grain statistics in this field. N.M.Vinogradova and V.F.Karavayev provide the following indication of when different zemstva were active collecting grain statistics:

Date of first organisation of harvest statistics	Provinces organising the collection of harvest statistics			
	a) Without interruption		b) With interruption	
Pre 1890	Voronezhskaya G.	1886	Kurskaya G.	1880-82. 1896,1898
	Kazanskaya G.	1885		
	Moskovskaya G.	1884	Ryazanskaya G.	1889-91, 1897
	Orlovskaya G.	1886		
	Poltavskaya G.	1887	Saratovskaya G.	1888-91, 1899-1906, 1909
	Samarskaya G.	1890		
	Khersonskaya G.	1887	Tavricheskaya G.	1887-88, 1899
1891-1895	Kostromskaya G.	1894	Vyatskaya G.	1892-1908, 1912
	Permskaya G.	1893		
	Leningradskaya G.	1893	Nizhegorodskaya G.	1891-1903, 1907
	Pskovskaya G.	1894		
			Tverskaya G.	1893-1904, 1908
			Tulskaya G.	1895-98, 1908
			Kharkovskaya G.	1891-93, 1901
1896-1900	Kaluzhskaya G.	1896	Vladimirskaya G.	1896-1900, 1902-07, 1914
	Ufimskaya G.	1896		
	Yaroslavskaya G.	1897		
	Yekaterinoslavsk G.	1900	Ulyanovskaya G.	1900-04 1912
			Smolenskaya G.	1900-06, 1912
			Tambovskaya G.	1896, 1897, 1899
1901-05	Vologodskaya G.	1901	Olonetskaya G.	1901-05, 1911
	Chernigovskaya G.	1904		
1906+	Bessarabskaya G.	1908		
	Kievskaya G.	1913		
	Penzenskaya G.	1909		

Source: V.F.Karavayev, 'Izdaniya zemstv 34 gubernii po obshchyei ekonomicheskoi i otsenochnoi statistikye vyishedshiye za vremya s 1864g. po 1 yanvarya 1911 g., SPb.1911, and N.M.Vinogradova, VS, 1925, No.10-12, p.44.

From this it can be seen that coverage was incomplete and spasmodic. The main reason for this was the central authorities' suspicion of the zemstvo statisticians and their work, which led to central attempts to control their work and restrict it to the narrowest possible limits. This attitude was certainly recognised and resented by the zemstvo statisticians themselves. Professor N.A.Kablukov in his 'Text to acquaint (the reader) with the conditions and methods of collecting and reworking data in zemstvo statistical investigations' wrote

> Frequently, the zemstvo statistician felt and knew that as soon as the immediate, direct practical task to which the zemstvo investigations were being applied, was solved, that all statistical work in the given zemstvo would finish. It sometimes happened that the processing of already collected material would be abruptly broken off and that local investigations would be called off when they had just got into full swing[1].
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> E.Z.Volkov describes even worse happenings, and also in particular emphasises that the zemstvo chairmen were often unsympathetic to the plight of the zemstvo statisticians[2].

After the agrarian unrest in 1902 in a few uezdy of Poltava and Kharkhov gubernii, the MVD blamed the local zemstvo statistical investigations and forced the zemstvo statistical office to be closed down in a number of gubernii[3]. From the 1880s a MVD circular had stated that

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1. N.A.Kablukov, Kurs Statistiki, M.1911, p.72
2. E.Z.Volkov Agrarno Ekonomicheskaya Statistika Rossii, M.1923, p.11.
3. See N.A.Kablukov, Kurs Statistiki, M.1911, pp.227-28.

the appointment of zemstvo statistical officials was subject to the affirmation of the local governor. In reactionary times this often meant that many statistical bureaux were understaffed and even without directors although the zemstvo itself wanted to appoint a qualified statistician who was willing to take on the job[1]. As we shall see below there was some basis in the fears which the MVD had of these radical zemstvo statisticians[2].

Methods used to collect data varied from zemstvo to zemstvo. There was no central coordinating body for zemstvo statistics; each statistical bureau was left to develop its own mechanism for collecting grain output statistics independently. Some zemstva collected their data through a network of voluntary correspondents, some through the local organs of administration, some used both; at least one zemstvo (Yaroslav) also used 'expeditions'. Some used interviews to obtain information, some used questionnaires, and others got their agents to make subjective evaluations.

The subjective evaluations of the voluntary correspondents were perhaps the most common of all these methods, but still only accounted for about a third of all the zemstvo investigations of grain production that were carried out[3].

The zemstvo statistics on grain production cannot be considered as either complete or homogeneous. They can be used individually for individual gubernia as control data for comparison with other data but great care has to be taken.

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1. See N.A.Kablukov, ibid., p.227
2. See pp.20
3. For a detailed examination of the different methods used to gather data see N.M.Vinogradova, V.S. 1925, No.10-12, pp.53-60.

The zemstvo statisticians were as we have already stated restrained from developing into an Empire-wide statistical network and from coordinating their efforts for political reasons. With the approach of the evolution and the collapse of the Autocratic political power the zemstvo statisticians were able to consolidate their positions; in fact the attempts of these statisticians to assert themselves were a not insignificant part of the Revolution.

The Tsarist authorities had good reason to be suspicious of these local zemstvo statisticians many of whom were involved or had only recently been involved in revolutionary activities. Many directors of zemstvo statistical offices had a revolutionary past. P.I.Popov director of Tula zemstvo statistical department 1909-17 (the future director of TsSU) had been imprisoned for 1½ and exiled for 3 years. V.G.Groman director of Penza zemstvo statistical department 1909-15 was an active Menshevik who had been imprisoned and exiled on numerous occasions. V.M.Obukhov, director of Petrograd zemstvo statistica office during the War had been an old Bolshevik and even a delegate to the Party's London conference. At a lower level several active Bolsheviks including A.D.Tsyurupa, A.G.Shlikhter and V.V.Osinsky had all found regular legal cover for their revolutionary activities by working, very competently as local zemstvo statisticians.

While the strength of the zemstvo statistical offices was continuingly growing, despite hindrances from the authorities, the TsSK network was not making any progress and plans to reform it had not gone through. Despite attempts to keep the zemstvo statistical departments isolated and not to allow any coordination or contact between them such meetings did occur.

A.I.Chuprov and N.A.Kablukov were the major early organisers of these meetings. Officially they were meetings of academic statisticians but the zemstvo statisticians were by far the most numerous group. The Statistical Department of the Moscow Juridical Society (known also as the Chuprov Society) was the most famous meeting place and this society held fairly regular meetings from the 1890s. Chuprov was also responsible for the formation of the first Congress(es) of Russian Statisticians, which were held as subsections of the Congresses of Naturalists and Physicians[1]. Commissions were also formed for the coordination of work between neighbouring zemstvos. However until the beginning of the war meetings of these statistical societies, congresses and commissions did not openly gather data and process them; they only discussed statistical methods and ways of improving the quality of statistics as a whole, i.e. usually they adhered to the restriction to academic matters that was officially imposed on their meetings.

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1. First Statistical Congress sub-section of 9th Congress of Naturalists and Physicians Moscow 1894, 2nd Statistical Congress under 10th Congress of Naturalists etc., in Kiev, 1898, 3rd Statistical Congress under 11th Congress of Naturalists and Physicians in Saint Petersburg, 1901, 4th Statistical Congress under 12th Congress of Naturalists and Physicians Moscow 1910-11, 5th Statistical Congress under 13th Congress, 1913.

b) Grain production statistics during the First World War 1914-17

i) Introduction

The war led to a fundamental change in the problems of evaluating the level of grain production and utilisation. This ultimately led to a change in the methods of evaluation and a greater role for the zemstvo statisticans. The zemstva had been allowed to form an all-Russian organisation the All-Russian Union of Zemstva but the activities of this organisation (and of the similar all-Russian organisation of town authorities) were initially restricted to organising relief work. The defeats of the tsarist army led to a very large flow of refugees[1]. The opening up of the Rumanian front in 1916 led to a flow of refugees from Bessarabia. And the retreat on the Turkish front in 1917 led to a flow of refugees from Turkish Armenia.

According to Volkov the number of refugees entering the area of what was to become the USSR, grew from 1.1 mln.on January 1, 1915, to 4.2 mln. in 1916, 7.8 mln. in 1917 and 9.7 million in 1918[2].

Apart from organising relief for these refugees the zemstva very soon became deeply involved in procuring grain for the rapidly expanding army[3].

Under these changed circumstances the zemstvo statisticians were at last allowed to spread their activities onto a national level and ultimately to carry out the first All-Russian Agricultural census. But the strain of the wartime change in circumstances also led to the beginning of a deterioration in the peasants' attitude to official statistics.

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1. By the time of the first wartime harvest (October 1915) the Central powers had occupied all of the Polish gubernii, the southern Baltic gubernii; Kurland G.,Kovno G., Vilna G., parts of Belorussia, Grodno G., parts of Minsk G., and part of Western Ukraine Volyin G.
2. See Volkov, p.104. See below p.85-7 for more details.
3. The zemstva involvement in military grain procurement had already begun long before the outbreak of War (see below p.160-2). But the expansion of the army from 0.4 million to over 10 million quickly changed their importance.

This change in peasants' attitude was a direct result of their change in circumstances. It had extremely significant consequences for the problem of obtaining reliable materials on the level of grain production and utilisation, and will therefore be described before we deal with the modifications in the organisation of grain statistics in this period. The war resulted in a high demand for grain in the north-west, and this, together with the relatively poor harvest of 1916 resulted in regional shortages. The Tsarist and then the Provisional Government (March-November 1917) moved towards the imposition of a grain levy on the peasants, in the form of compulsory purchases of statistically determined grain surpluses; this was imposed at a fixed price, which, in inflationary conditions, was relatively low. The peasant automatically reacted to such attempts by denying that he had any surpluses, or at least that he had as large a surplus as the authorities claimed. In order to carry out the levy and to make evaluations of the level of surpluses a central Special Food Council, established during the war, appointed a network of local plenipotentiaries. Its local plenipotentiaries dealt with the local authorities at the uezd level, using the services of the local supply commissions (KNP)[1]

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1. See above p.6 for the creation of these commissions.

The local supply commission and the food council plenipotentiary based their assessment of the existence of surpluses on the results of the 1916 agricultural census, together with the available statistical data collected by GSK, the local zemstvo or the Ministry of Agriculture's correspondents network.

As soon as the peasants discovered, or even suspected, the use which was being made of the statistical data which they had been freely and relatively disinterestedly supplying disinterest was replaced by extreme caution. The reliability of the data began to suffer.

This was the beginning of a fundamental change in the peasants' attitude to statistical materials. The Bolshevik revolution was followed by the period of war communism (1918-20), involving severe requisitioning; the peasants' hostile attitude and distrust increased. This fundamental change in the conditions in which grain statistics were traditionally collected in Russia required a great organisational change in the methods of collecting these statistics. Such organisational changes in response to these changed circumstances were not fully introduced by the central statistical agency until the mid 1920s, and they will be dealt with in the following chapter. In my view, the significant organisational changes in 1914-17, described below were not caused by the Fundamental changes in peasant attitudes, which had not gone far enough at that time to be a serious obstacle to accuracy. They were due rather to the changed political circumstances, the needs of the state, the weakness of the central authorities and the growth in importance of local political groups.

ii) The organisation of grain statistics 1914-17

The conflict between the progressive zemstvo statisticians and the central statistical agencies of the MVD in the pre-war period has

already been described above[1]. Local statisticians were extremely dissatisfied with the restrictions which the MVD had placed on their scale of operations, and were unstinting in their criticism of official central state statistics. I have argued above that the considerable dissatisfaction with official grain statistics of the TsSK of the MVD was exaggerated. It was possible due to their political outlook, and was not unrelated to the demands that they were making for a larger role for themselves in state statistics.

Just before the war the demands of these local statisticians crystalised around the need for an All-Russian Agricultural Census[2]. Much of their later agitation was associated with their demand for this Census. In September 1913 the first All-Russian Agricultural Congress was held in Kiev. At this Congress Professor K.G.Voblyi made a speech advocating the carrying our of an All-Russian Agricultural Census with the participation of local zemstvo and town statisticians, timed to coincide with the planned 1915 population census[3]. The Congress accepted the proposals and the commission of the Congress worked out plans for its implementation and timing in detail, and handed these on to the Chuprov Society for methodological revision. The Chuprov Society also approved of the plan but it was coldly received by the authorities (the Ministry of Internal Affairs, and TsSK), and the project was shelved.

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1. See pp. 18-20
2. Censuses of horses had been carried out by TsSK for military purposes since 1882, and the first population census was held in 1897, but an All-Russian Agricultural Census was beyond the means of TsSK unless they were to use the assistance of the zemstvo statistical network in the localities.
3. See Trudy of the 1st Agricultural Congress in Kiev, 4-10 September 1913, vol.1, pp.10-11, vol.3, pp.55-62, 273-78. Quoted from E.Z.Volkov 'Agrarno Ekonomicheskaya Statistika Rossii' M.1923, p.248.

Early in 1914 in connection with the preparations for the re-negotiating of the Russian-German Trade Agreement that was to take place in 1920 a whole series of Congresses had gathered and they too echoed the demand for an agricultural census[1]. With the outbreak of war these congresses quickly dissolved[2].

The War brought problems that could not be ignored. In supplying the army and the civil population the state had to rely on large and increasingly powerful local organisations.

In August 1914 the zemstva and town authorities were allowed to form organisations on an All-Russian scale. An All-Russian Union of Zemstva and an All-Russian Union of Towns were created for the duration of the War and initially with the narrow task of working for the relief of sick and wounded soldiers[3]. Prince G.E.Lvov, who later became the first Prime Minister in the Provincial Government headed the Union of Zemstva.

For the first year of the War these new organisations appear to have restricted themselves to the narrow field of relief work. But the staff of the Union of Zemstva and the Union of Towns was expanded, well beyond the scope needed purely to deal with relief work and contained some very able and ambitious people. The 27-year-old A.V.Chayanov was employed by the Union of Zemstva where he headed their economics and statistics department. Within this department worked the 23-year-old N.D.Kondratiev

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1. See Volkov, ibid., p.249.
2. For the future history of Soviet statistics it is interesting to note that V.V.Obolenskii (N.Osinsky), the future director of TsSU and TsUNKhU was temporarily employed at this time by the Kharkov Oblast Committee for the re-negotiation of the Russo-German Trade Agreement, and produced for them a survey of the evolution of grain yields in Southern Russia 1889-1912, which was published in Kharkov in 1915. (V.V.Obolenskii, Urozhai khlebov v yuzhnoi Rossii (1899-1912gg),Kharkov,1915).
3. For this brief account of the rise of the Zemstva see M.T.Florinsky, The end of the Russian Empire, Collier Books, New York, 1967, ppp.124-44. (First published in 1931 by the Carnegie Endowment for International Peace).

and several other economists and statisticians[1]. The statistical economics department of the Union of Towns was headed by the slightly older but no less ambitious V.G.Groman, former director of the Penza Gubernia zemstvo statistical department[2].

With the disastrous military reversals in Galicia in April 1915 the Union of Zemstva and the Union of Towns began agitating for a greater involvement in economic and political matters under the slogan of the need 'to mobilise industry'. But still the government was reluctant to give too much power to the zemstva and town organisations and to the radical elements like the statisticians who played an important role within them.

In March and April 1915 the Chuprov Society in Moscow turned again to the authorities with the request to let the zemstvo statisticians participate in the carrying out of an All-Russian Agricultural Census. When this was opposed by the authorities, the Society modified its request and asked for 'a census of stocks of foodstuffs of mass consumption', they explained that this was necessary 'for the solution of all questions connected with the correct organisation and provisioning of the population with necessary products'. However the government still refused to accept the initiative.

Three months later, in July 1915, a session of the Central Commission of the Union of Towns was held in Moscow concerned with 'economic questions in connection with the high cost of living and the supplying of the army'. V.G.Groman the new director of the Statistical-Economic Bureau of the All-Russian Congress of Towns, described 'the correct scientific accounting of the production and consumption rate of grain' as one of the 'necessary measures which had to be taken against the worsening of the food supply

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1. See N.Jasny, Soviet Economists of the Twenties, Cambridge 1972, pp.158,200.
2. See N.Jasny, ibid., Cambridge 1972, pp.91-5. Groman was 42 years old in 1915.

problem'. With the full support of the Commission he called for a census of sown areas, yields, and stocks of grains for the consumption of the population and livestock, with the aim of correctly regulating commodity exchange (tovaroobmen)'; on behalf of the All-Russian Union of Zemstva and Towns, he asked the government to affirm the resolution about the census in a 'legal manner'[1]. But the government still refused.

The creation of the Special Councils and particularly the Special Council on Food in the following month in August 1915 somewhat changed the position. The important feature about these Councils was that they were to include within their membership representatives of the new social organisations: the Union of Zemstva and the Union of Towns[2]. P.V. Struve (the former legal Marxist) was the representative of the All-Russian Union of Zemstva on the Special Food Council, while V.G.Groman became the representative of the All-Russian Union of Towns.

Given this encouragement Groman soon started organising the statisticians. In November a special All-Russian Conference of Town and Zemstva Statisticians was convened in Moscow, with the express purpose of 'working out the scale of supply needs and of food stocks in the country'. Only when this conference rejected all compromises and through its spokesman (Groman) underlined the necessity of carrying out an agricultural census did the government finally give way and instruct the Special Food Council to supervise the carrying out of such a census.

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1. See Protokoli Soveshchaniya po Ekonomicheskim Voprosam, svyazannim s dorogoviznoi i snabzheniyem armii, Moscow 11-13 July 1915. Cited from E.Z.Volkov, ibid., p.250.

2. See M.T.Florinsky, ibid., p.102.

In the beginning of March 1916 a further Congress of Town and Zemstvo Statisticians was called, with the specific task of drawing up a plan and programme for the forthcoming census. The statisticians elected from amongst themselves an Executive Commission to take care of preparation of the census while the Congress was not sitting[1]. Groman appears to have been elected chairman of this commission and P.I.Popov (the head of the Tula Gubernia zemstvo office) was one of its members.

The Executive Commission of the statisticians soon found themselves in conflict with the Special Council. The Special Council wanted to speed up the taking of the census and decided to omit the livestock census. The Executive Commission of the statistical congress jointly with the central commission of the All-Russian Congress of Zemstvos and Towns, now called an emergency Congress of the zemstvo and town statisticians, which met on 5-7 March 1916; this emergency Congress categorically forbade such omissions. The Ministry of Agriculture decided that it had no alternative but to affirm the plan of the statisticians, which it did on 3 April 1916. It thus over-rode the plans of the Special Council; while the Special Council was formally supervising the census, it in fact had very little power independent of the statisticians. On 15-18 April 1916 the All-Russian Congress of Zemstvo and Town Statisticians took the final decisions on the details of collecting the

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1. See N.Ya.Vorobyev, Syezdy i soveshchaniya statistikov v dorevolyutsionnoi Rossii i v SSSR, in Istoriya Sovetskoi gosudarstvennoi statistiki,M.1960, p.405.

data and planning their reworking. The census was to be carried out in the localities by zemstvo statisticians and by special plenipotentiaries of the Special Food Council. These, together with correspondents from the zemstvo and Ministry of Agriculture network, were made responsible for assessing the size of the sowings in 1916.

Friction between statisticians and the central authorities in the end did not too adversely influence the census procedures. The census covered 49 gubernii of European Russia (all except Stavropol). According to its findings these contained 15,645,508 separate households, with a population of 84.7 mln. and a sown area of 78.44 mln hectares and 140.24 mln. head of livestock. But the friction between the statisticians and the central authorities had considerable effect on the working out of the data. P.I.Popov together with Groman was the main spokesman of the Statistical Congress, reported to a further session of the Congress of Statisticians, held on 17-21 February 1917 that the results of the enquiry in a whole row of gubernii were not fully worked out. This was very late considering the urgent tasks the data were required for.

At this Congress Popov launched the slogan that their work was directed towards 'the needs and interests of the construction of a new society'. In the pursuit of this aim the congress decided to repeat the Agricultural census[1].

The influence of the February Revolution on the collection of statistics was very great. According to E.Z.Volkov, 'the revolution destroyed with one blow the old argument between the zemstvo statisticians and the bureaucracy of the old regime, taking the power out of the hands of the bureaucracy and transferring it to the hands of democracy[2]. But,

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1. See E.Z.Volkov, ibid., p.256
2. See E.Z.Volkov, ibid., p.258.

as we have seen, this process was very far advanced before the February Revolution; the statisticians had already become openly rebellious and their rebellion had almost completely succeeded. For them the February Revolution was a mere confirmation of the dominance that they had already earned for themselves.

Immediately after the February Revolution a Department of Census Statistics was created in the Ministry of Agriculture[1], and P.I.Popov was placed in charge of it.[2] On 18-22 April 1917 a further Congress convened by the Executive Commission of the Statistical Congress arranged the final details of the repeat agricultural census; this census was now to assist with preparation for a land reform. In line with the new circumstances the Congress was now renamed 'Congress of Zemstvo, Town, and Government Statisticians with Representatives from the Statistical Sciences'.

The data for this census were again collected by local zemstvo and town statisticians, and by plenipotentiaries of the Ministry of Agriculture and by local correspondents. The data were collected before the October Revolution. After October, the Department of Census statistics, now under the renamed Peoples Commissariat of Agriculture (NKZem), and still headed by Popov called an All-Russian Conference of Statisticians in Petrograd in December 1917; at this conference the plan for working out these data was approved[3]. The results however were not worked out in any complete form and were only published much later after considerable delay .

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1. Note the Russian use of the word (perepis) is somewhat less precise than our concept of census as it includes mass surveys. The word census is consequently used here in its Russian sense.
2. Popov was aged 46 at this time. N.D.Kondratiev aged 25 became one of the Deputy Ministers of Agriculture at this time(see N.Jasny,ibid., Cambridge 1972,p.158).
3. See N.Ya.Vorobyev,ibid.,p.406.

c) Grain utilisation statistics before 1918

The collection of statistics of grain utilisation in the pre-war period was not organised in any comprehensive or regular way. As in all non-planned economies there was no need for such statistical materials; it would have been costly to produce them and the central government was not willing to finance such programmes for the sake of academic interest[1]. As we shall see later, local authorities took a more enlightened view and several local studies were carried out.

Very rough estimates of grain in excess of basic rural consumption were published occasionally by the Ministry of Agriculture and by TsSK. These provided an indication of the material conditions of the peasantry in different regions, and consequently served a political purpose by indicating the likelihood of peasant unrest. But these balances were extremely crude; they incorporated a traditional unchanging grain consumption norm which, as is explained below, had very little statistical basis.

The only grain utilisation statistics that had been kept for any length of time and with any degree of system were those related to the payment of taxes; data on military rations and on grain consumption for seed (seed rates) were also collected. Data for tax purposes included exports and imports, grain cartage and a substantial part of the industrial processing of grain. Military rations covered personal consumption rations and food rations for horses. Data on seed utilisation were available because grain yields were initially calculated in terms of production per unit of sown seed.

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1. In fact the government was quite reluctant to finance such basic statistical programmes as the carry-out of a regular programme of demographic censuses.

Only with the extension of the activities of the zemstvo statisticians into budget investigations on a sample survey basis were any statistically based figures available for the consumption norms of the population and for the feed norms for livestock.

The earliestavailable grain consumption studies were those in the late 1880s by F.A.Shcherbin on peasant consumption in Voronezh Gubernia, and by F.F.Erisman on the consumption of workers in Moscow[1]. But after the famine of 1891 the Zemstvo statisticians as a whole became very interested in this question. A combined session of the first organised Statistical Congress (a sub-section of the IX Congress of Russian Naturalists and Physicians) and the statistical section of the Moscow Juridical Society was held in Moscow on 6 January 1894 under the chairmanship of N.A.Kablukov; this discussed consumption statistics and how the work of the zemstvo statisticians could be organised to improve them[2]. The major speech was given by L.N.Maress 'On monographic methods of investigation and their application to the food question'. All the speakers agreed that the accurate knowledge of the level of consumption was desirable, and that current knowledge was poor.

Maress began the debate by stating provocatively, 'We know nothing or almost nothing about what the population eats and about what quantities of food are normally consumed'; 'We have insufficient local investigations on this question'; 'Zemstvo statistics hardly touch this important side

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1. See Sbornik statisticheskikh svedenii po Voronezhskoi gubernii, tom 2, vyp.2, Krestyanskoye khozyaistvo po Ostrogozhskomu uezdu, compiled by F.A.Shcherbin, Voronezh 1887, see also his later study Krestyanskiye byudzhety, Voronezh 1900. F.F.Erisman
See A.V.Chayanov and G.A.Studenskii, Istoriya byudzhetnikh issledovanii, M.1922, pp. 24-85 for a history of the budget investigation.

2. This account is taken from A.E.Lositsky's introduction to Sostaniye pitaniya Selskogo naseleniya SSSR 1920-1924 gg., Trudy TsSU, Tom XXX, vyp.2, M.1928, pp.7-15. And from A.V.Chayanov and G.A.Studenskii, M.1922, ibid., Lositsky cited extensively from the stenographic record of this Congress 'Trudy podsektsii statistiki IX Syezda russkikh yestestvoispitatelyei i vrachyei, Moskva 3-11 yanvarya 1894g., Chernigov 1894.

of the life of the nation'. Professor A.I.Chuprov noted correctly that even in the west there were very few studies of this important question. And N.F.Annenskii pointed out that in the recent famine there had been considerable confusion about the 'normal' level of consumption: 'one authority, basing himself on the "works" of the handicraft commission, stated that the average level of consumption per person per year was 18 pds of rye + 5 pds of other grains i.e. 28 pds of rye, but another authority found a figure of 18 pds of rye which he considered to be sufficient for one healthy adult; meanwhile the zemstva proposed 12 pds and the authorities accepted that 9 pds was sufficient to feed a full grown person'. Annenskii concluded 'This kind of mess needs to be cleared up; and in order to do it zemstvo statisticians must introduce the statistical study of the scale of the normal consumption of the mass of the population'. He added that 'If we had firmer data on the scale of normal consumption, they would serve as a useful criterion for verifying the reliability of our evaluations of the scale of grain production'[1].

At the 1894 session the statisticians also discussed how best to arrange a series of investigations to improve their knowledge. A.I.Chuprov, N.F.Annenskii and F.F.Erisman favoured a monographic method of studying consumption. F.A.Shcherbin proposed that in order to get a full account of grain consumption it would be necessary to organise an investigation of a whole series of utilisation budgets. And N.A.Kablukov proposed that the correspondents in the correspondents network be prevailed upon to supply consumption data.

The Chuprov monographic method could only be of general significance if the individual households which were exposed to detailed monographic investigation were truly typical of all the households in the given region.

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1. See A.E.Lositsky, ibid., Trudy TsSU, Tom.XXX, vyp.2,M.1928, p.9.

A mathematical statistical method was therefore proposed to measure all significant elements of variation between different households, in order to select a 'typical' household or a 'typical' selection of households. In this way the Russian statisticians moved towards sophisticated sampling techniques for their household investigations.

The Shcherbin full budget balance method had apparently worked well in Voronezh and the North Caucasus during the 1891 famine; less detailed investigations, which did not check the total production and utilisation of all the elements in the household, tended to give faulty results. However, many statisticians considered that such detailed budget balances were too expensive and could not be carried out in a sufficient number of households to give a typical sample coverage; and Kablukov proposed that the additional expense of carrying out detailed budgets could be covered by getting peasant correspondents to fill in the budget forms instead of the zemstvo statisticians. But Chuprov pointed out that the intelligent literate peasants who were likely to be the correspondents were unfortunately entirely untypical of the mass of Russian peasants and so would provide unrepresentative data. This led A.N.Leontiev to propose that correspondents be requested to provide data not on their own household but on a household which they themselves considered to be 'typical'; they should provide data on the size and characteristics of their selected 'typical' household so that the statisticians could verify for themselves that the selected household was 'typical' by statistical criteria.

Although Shcherbin refused to accept that 'peasant-statisticians' could be as reliable as 'teacher-statisticians' when it came to dealing with correspondents, the congress as a whole ended in considerable unanimity. The enthusiasm was such that Kablukov had difficulty in closing the proceedings at well past midnight. In his concluding speech Kablukov stated that 'It was impossible to use voting as a method of deciding

scientific questions' and that different local conditions would doubtless make it more advisable to use different methods of investigation.

During the next 24 years before the creation of the Soviet Central Statistical Authority and the creation of a unified department of consumption statistics under Lositsky[1], many different methods were used to compile consumption data in different regions. Several attempts were made to aggregate the results of these local investigations in order to present a consumption model applicable to the whole country. An attempt by L.N.Maress in 1897[2] was followed by N.A.Svavitsky's slightly more ambitious project for the Efron and Brokhaus encyclopaedia[3]

But it was not until the changed circumstances of the war that it became possible for A.V.Chayanov and V.Shub, enthusiastically encouraged by Groman, to direct teams of statisticians in the analysis and aggregation of all the available consumption data[4]. The results of these

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1. See later chapter for an account of this.
2. See L.N.Maress, Proizvodstvo i potrebleniye khlebov v khrestyanskom khozyaistve, in A.I.Chuprov and A.S.Psnikov (eds.), Vliyaniye urozhaev i khlebnykh tsen na nekotorii storoni russkogo narodnogo khozyaistva, SPb.,1897
3. See N.A.Svavitsky's article on Krestyanskiye Byudzhety, in Entsikloped.slovar Brokgauz i Efron
4. Chayanov was the general editor for the work concerned with analysing rural food and feed consumption. (A.V.Chayanov (ed.) 'Normy prodovolstviya selskogo naseleniya Rossii po dannyim byudzhetnikh obsledovanii', Vyp.1, Materialyi po voprosam razrabotki obshchego plana prodovolstviya naseleniya, SPb.1916 and A.V.Chayanov (ed.) S.A.Klepikov, 'Pitaniye russkogo krestyanstva', chast 1, Normy potrebleniya glavnyeishikh pishchevyikh produktov, Materialy po izucheniyu massovogo potrebleniya, vyp.ii, M.1920 and G.Shub was the general editor for the work concerned with analysing urban food consumption. (G.Shub (ed.), R.Kabo, Potrebleniye gorodskogo naseleniya Rossii (po dannym byudzhetnyik i vyiborochnyikh issledovanii). M.1918). Groman wrote the general introduction to Chayanov's first book listed above.

analyses were intended to be used for the food supply plans which Groman and others were preparing at this time. These data were included in the official report on the prospects for the 1917 harvest and its utilisation. This report[1] was drawn up by the statistical department of the Ministry of Food, under its director A.E.Lositsky. It appears to have been modelled on the earlier balances drawn up by Vilson in the 1860s[2], and was to serve as a model for the grain plans of the 1920s.

The tragedy of the situation was that the zemstvo statisticians were not given a chance to demonstrate their statistical and organisational ability until the economic position was almost impossible.

Although the aggregations of Chayanov and Shub represent a considerable achievement for the local statisticians' work, the materials which were available to them were extremely incomplete and heterogeneous. A revolution in the organisation of grain consumption statistics would come not from aggregating data collection under the old system, but from a revolution in the organisation of the collection of new statistics on consumption. And that was to come about after the creation of the new Soviet Central Statistical Authority, TsSU, and the creation of a powerful department of consumption statistics dedicated to following the advice of Chuprov, Kablukov, Shcherbin, Annenskii and other former great zemstvo statisticians in improving the scientific knowledge on food consumption.

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1. See A.E.Lositsky (ed.) Urozhai khlebov v Rossii v 1917g; Valovoi i chistyi sbor, prodovolstvenniye i kormoviye potrebnosti, mestniye izbyitki i nedostatki glavnykh khlebov., M.1918

2. See later p.253

2. The comparability and reliability of these grain statistics

In this section I will begin by reviewing the pre-revolutionary studies of the comparability of the statistical material, and then consider the claims of statistical workers in Gosplan SES regarding its reliability. These claims rest partly on Strumilin's account of the work of pre-revolutionary analysts, and partly on the evidence of utilisation data. It will be shown that Strumilin was wrong in his account of the claims of the pre-revolutionary analysts, and I conclude that the best analyses of pre-revolutionary yield data indicate that the level of yield given by central state statistics was probably 'very close to the real level', that evidence concerning the reliability of sown area data is much less certain than claimed. It will also be shown that the reliability of the pre-war grain forage balances is so slight that balances could be, and were, drawn up to justify both corrected and uncorrected data. Shcherbin's dream of utilisation data reliable enough to verify the reliability of production data had not yet come true. Therefore Gosplan pre-revolutionary grain forage evidence cannot be considered to support the Gosplan corrections which increased the pre-war production estimates.

a) Pre-war data

i) Comparability of data

One of the earliest studies of the question of the comparability of different sources of grain statistics, a very important influence on attitudes to the reliability of official statistics, was carried out by A.Fortunatov and published in 1893[1]. Professor Fortunatov compared the

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1. See A.Fortunatov, Selskokhozyaistvennaya statistika Evropyeiskoi Rossii, M.1893.

average level of yield of the five main grains in the European part of Russia, using data from gubernorial accounts, from TsSK, and from the Department of Agriculture and also using the results of concrete investigations of individual households. The data are listed below (they are given in 'sam' - production per unit of seed used)

Year	From Government Accounts	From TsSK		From Dept.Agr.		From concrete investigation
		Allotment hh	Private hh.	Allotment hh.	Private hh.	hh
1880	3.3					6.4
1881	4.5			5.88	7.04	7.4
1882	4.2			5.82	6.91	6.6
1883	3.8	3.86	4.60	4.65	5.65	6.7
1884	4.4	4.53	5.32	4.80	5.64	7.1
1885	4.2	4.54	5.36	4.82	5.68	7.8
1886	4.3	4.36	5.22	4.60	5.52	8.2
1887	5.1	5.04	5.96	5.29	6.22	9.1
1888	4.8	4.85	5.69	5.04	5.92	8.4
1889	3.4	3.88	4.65	4.04	4.86	6.5

Source: See A.Fortunatov, ibid., M.1893, p.192.

Furtunatov himself admitted that the results of the investigations of individual households covered 7,603 extremely untypical households; these certainly had a level of culture and technology much higher than average and may consequently have been expected to have also had a much higher than average level of yield. It will be noticed that the data from the gubernorial accounts were very similar to those from TsSK, which is not surprising when we remember that they were collected by the same agents, although allegedly using different methods. And the Department of Agriculture data are in all cases somewhat higher than the TsSK data. In order to see whether there was any regularity in the relationship between these different sets of data, the gubernorial accounts data and the concrete investigations on the one hand and the TsSK and the Department of Agriculture data on the other were plotted

on a scatter diagram [illegible].

This diagram indicates the very close correlation between the TsSK and Department of Agriculture data for all years apart from the first year of collecting the TsSK data and a fairly high correlation between the gubernorial account data and the concrete investigations data;

TsSK/Dept.Agr.	1884-1889	Peasant	R^2 = 0.99	y = 051 x = 0.004
	1883-1889		R^2 = 0.769	
TsSK/Dept.Agr.	1884-1889	estates	R^2 = 0.988	y = 0.017x+ 181
	1883-1889		R^2 = 0.648	
Gubernorial Accounts/Concrete investigations				
	1880-1889		R^2 = 0.728	y = 1.387x + 1.595.

The Department of Agricultural data were regularly 5% higher than the TsSK data (although 20% for 1883). The concrete investigations data were slightly less regularly 77% higher than the gubernorial accounts data. And the gubernorial accounts data and the TsSK peasant data were virtually identical.

Fortunatov was most scathing about the reliability of the TsSK data, but if we bear in mind that the Department of Agriculture data were based on reports from voluntary correspondents who could be expected to have a slightly higher level of culture and of yields than the average household, and that 1883 was the first year that TsSK data were collected, then this comparison of different data would indicate that the pre-revolutionary TsSK data were very reliable.

The most cited even if little studied comparison of pre-revolutionary data was that made by D.N.Ivantsov, that was published in

1915[1]. This was the work that was repeatedly cited as justification for a 9% correction to TsSK yield data and a further 9% correction to TsSK sown area data.

Concerning grain yields Ivantsov studied the zemstva, the TsSK and the Department of Agriculture data on rye yields in 18 provinces for a period from 7 to 26 years in each province according to the availability of the data. The percentage differences between the TsSK data and the zemstva and the Department of Agriculture data were listed as in the following table (TsSK data = 100). The figures in brackets after the names of the gubernia refer to the number of years for which the data were taken.

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1. D.N.Ivantsov, K kritikye russkoi urozhainoi statistikye; opyt analiza nekotorykh offitsialnyikh i zemskikh tekushikh dannyikh, Petrograd 1915, (Zapiski Imperatorskogo Russkogo Geograficheskogo Obshchestva po otdeleniyu statistiki, Tom XIV) In his introduction Ivantsov explains that the given book was part of a larger work written in 1920 for Professor N.A.Kablukov's seminar on the study of the statistics and dynamic of Russian yield. The paper was subsequently presented to the Imperial Russian Geographical Society at a session on December 13, 1913.

Province		% of difference from TsSK data: Private Land		Peasant allotment Land	
		Zemstva	Dept. of Agr.	Zemstva	Dept. of Agr.
Voronezhskaya G.	(23)	0	+ 5	+ 2	+ 9
Orlovskaya G.	(26)	+ 7	+ 7	- 2	+ 5
Samarskaya G.	(13)	+ 5	+30	+ 9	+27
Nizhegorodskaya G.	(19)	+ 9	+ 6	+ 2	+ 9
Ufimskaya G.	(15)	0	+14	- 8	+16
Kazanskaya G.	(25)	+ 9	- 2	+18	+11
Saratovskaya G.	(8)	+ 7	+ 2	+10	+15
Kharkovskaya G.	(8)	+31	+13	+ 4	+ 8
Chernigovskaya G.	(7)	+12	+17	+ 6	+14
Poltavskaya G.	(23)	+25	+10	+ 2	+ 2
Khersonskaya G.	(21)	- 8	+13	- 3	+17
Yekaterinoslavsk G.	(9)	+12	+20	-12	+ 5
Moskovskaya G.	(24)	+ 2	+ 3	+ 2	+ 7
Vladimirskaya G.	(10)	-12	+18	-13	+ 9
Kostromskaya G.	(15)	+10	+14	+ 9	+ 5
Kaluzhskaya G.	(11)	+ 9	+14	+24	+18
Pskovskaya G.	(8)	-18	+ 8	-18	+ 8
Vyatskaya G.	(11)	-	-	- 9	+11
Average (weighted by sown area)		+ 6	+11	+ 1	+11
Average (not weighted by sown area)		+10	+12	+ 9	+11

Source: D.N.Ivantsov, ibid., P.1915, p.26.

The only conclusions which Ivantsov himself drew from these results were that the zemstva data were the most reliable, and that peasant data were more reliable than estates data, and that the data were on the whole relatively homogeneous[1]. Elsewhere however he concluded:

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1. See D.N.Ivantsov, ibid., p.29.

> As regards the absolute degree of reliability of these data, the data are not satisfactory. They fluctuate sharply in different directions, making it impossible to state which is the most correct level in each case[1].

According to the statistician M.A.Sirinov, Ivantsov actually spoke out specifically against the feasibility of applying correction coefficients to the yield data:

> If this huge percentage difference (between TsSK, Department of Agriculture and zemstvo data) was constant, then the addition of a correction would make sense. The trouble is that for different years it fluctuates sharply up and down[2].

As regards sown area Ivantsov was only able to carry out a much more limited comparison of grain sown area in only 5 gubernii for only 5 individual years. For what it is worth this comparison is given below:

Province	Year	Sown area in th.desyatina according to TsSK	Zemstva	Differences in th.des.	%
Poltavskaya G.	1910	2,113	2,422	+309	+14.6
Khersonskaya G.	1909	3,690	4,322	+632	+17.1
Saratovskaya G.	1909	2,761	2,803	+ 42	+ 1.5
Tulskaya G. (2 uezds)	1910	156	134	- 22	-14.7
Sum of all 4 cases*		10,613	11,600	+987	+ 9.3

Source: D.N.Ivantsov, ibid., P.1915, p.129.

*Note: Ivantsov did not present an aggregation of these data I have only done so here to indicate where those who have claimed to have found a justification for a 9% correction to sown area have got their figures from.

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1. See D.N.Ivantsov, ibid., p.148.
2. Cited from a speech by D.N.Ivantsov to the Moscow Oblast Agronomical Congress, recorded by M.A.Sirinov. See M.A.Sirinov, Ocherkyi po agrarnoi statistikye, M.1923 pp.568-9.

During the War as the Special Food Council became actively involved in surveying food availability, it naturally began considering the reliability of the different types of grain statistics. This of course became particularly important in 1916 when the TsSK stopped producing harvest data. The head of the statistical section of the Special Food Council, P.Rumyantsev, quoted Ivantsov's work and stated his agreement with Ivantsov's general conclusions.

> In as much as it is possible to judge from the analysis of D.N.Ivantsov (K kritikye russkoi urozhainoi statistiki) TsSK normally gives the lowest indicator, the Department of Agricultural Economy on the contrary the highest, and the local current statistics are between them. This is affirmed by the comparative material of the directorate of the special commission for food supply[1].

The statistical section of the Special Food Council had in fact carried out an analysis which covered a more limited number of years (1909-13) than Ivantsov's but was nevertheless much more broadly based in the kinds of grains included and the number of provinces covered. Instead of covering just rye in 18 provinces, the special council survey covered 5 types of grain for up to 29 prpvinces. The data are listed below:

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1. P.Rumyantsev, Materialy k prodovolstvennomu planu, Urozhai khlebov v Rossii v 1916g., Petrograd 1916, p.VIII

Average yield in ts/ha

		Zemstva current statistics	TsSK	Dept. of Agr. Econ.	Zemstva/ TsSK	Dept. of Agr. Econ./ TsSK
Winter Rye	29	7.87	7.30	8.11	107.8%	111.1%
Winter Wheat	9	10.10	9.37	10.04	107.8%	107.2%
Spring Wheat	12	7.09	6.65	7.67	106.6%	115.3%
Barley	17	8.45	8.18	8.87	103.3%	108.4%
Oats	29	8.59	8.00	8.59	107.4%	107.4%

Source: P. Rumyantsev, Materialy k prodovolstvennomu planu, Urozhai khlebov v Rossii v 1916g. Petrograd 1916. f VII

In the following years this kind of analysis was repeated on a greater and greater scale. The figures worked out by TsSU in the early years of the Revolution for the years 1906-14 covered 8 grain types, plus peas, potatoes and sown grass, and 30 provinces in European Russia, 3 provinces in the North Caucasus, 4 in Siberia, 7 in the Ukraine and 1 in Turkestan (i.e. 45 out of a possible 78 provinces)[1]. The TsSU study, published in 1921, referred to peasant and estates lands together; in as much as they were used for comparison with later years when there were only peasant lands, these figures may have caused some confusion. However in the following year TsSU published an even more detailed comparison for just the peasant lands and recommended that these replace the series given earlier[2]. The following table lists Department of Agriculture data for peasant lands in 1905-14, as a percentage of TsSK data, as given in this latter source:

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1. See Trudy TsSU, Tom VIII, vyp.1, M.1921, pp.244-62
2. Trudy TsSU, Tom VIII, vyp.2, M.1922, pp.362-64

Crop	All USSR less SCR	European Non Chern Zem	RSFSR Chern Zem	UkSSR	Siberia	Caucasus
Winter Rye	112.1	110.2	116.7	109.0	108.8	115.9
Spring Wheat	103.1	103.4	103.0	106.2		116.6
Winter Wheat	100.0	85.5	93.8	102.4		
Barley	106.5	106.1	103.8	106.6		118.2
Oats	108.1	107.9	113.1	103.1		116.1
Millet	105.8	115.4	107.9	103.8		

The data given by Kondratiev and Oganovsky in their compendium of agricultural statistical materials allow us to calculate how the difference between TsSK and Department of Agriculture data changed over time from 1901-1915 for different grains.

A comparison of different yield data as calculated from N.D.Kondratiev (ed.)

	1901/ 1905	1906/ 1910	1911/ 1915	1913	1916	1917	1918	1919	1920	1921
Winter Rye										
TsSK	49	45	52		64					34
Min zem	54	47	59		63	43	41	39	29	33
%	110%	104%	113%		98%					
Winter Wheat										
TsSK	61	56	64	76	88					27
Min zem	63	57	66		68	50	38	41	26	25
%	103%	102%	103%		77%					
Spring Wheat										
TsSK	40	39	40	50	36					26
Min zem	44	42	47		49	40	33	39	23	26
%	111%	108%	119%		135%					100%
Oats										
TsSK	48	48	50		55					36
Min zem	49	50	58		56	42	40	44	35	35
%	102%	104%	116%		102%					
Barley										
TsSK	50	53	54		73					25
Min zem	51	51	57		57	45	26	39	24	19
%	102%	104%	106%		78%					
Buckwheat										
TsSK										
Min zem	29	32	39		50	43	28	16	-	19
%										
Millet										
TsSK										
Min zem	44	46	51		48	42	46	32	-	26
%	119%	100%	111%		98%					

Sources: N.D.Kondratiev (ed.) Selskoye khozyaistvo Rossii v XX vekye, M.1923
Min Zem data from N.Kondratiev (ed.) ibid., p.158.
TsSK data calculated from production data ibid., p.196 and sown area data ibid., p.106.

Note: The TsSK figure for 1916 was aggregated by using the results of the 1916 agricultural census. This census indicated a much higher area of spring wheat than earlier indicated, hence the untypical low evaluation of Spring wheat yields by TsSK for 1916.

Having given an account of the pre-revolutionary and early Soviet work analysing the comparability of pre-revolutionary sources of grain statistics, I now turn to a consideration of the claims that were made by Gosplan SES concerning it.

ii) Gosplan's evaluation of the reliability of pre-war grain production data

The attitude of Gosplan SES was that the pre-revolutionary data of TsSK should be inflated by 19%. This was to cover a 9% inflation to all sown area and a 9% inflation to all yield data[1]. This correction was applied systematically by Gosplan SES to all grains and to all regions without discrimination[2]. The justification for the application of this crude correction was given by Strumilin in 1924 when he wrote:

> In pre-war times zemstvo statistics were considered the most exact. In comparison with them the data of the Central Statistical Committee for peasant lands, which now lie at the basis of the calculations of the Central Statistical Authority were too small and needed a correction which according to Ivantsov came to 9% on average for yield and a similar percentage for sown area. D.Ivantsov K kritike urozhainoi statistiki, Petrograd, 1915, pp.26, 129. The TsSK gross harvest therefore needs a correction of not more than 19% (1.09 x 1.09 = 1.19). In Gosplan we verified by means of the balancing method the gross harvest of TsSK for 1906-14 by comparing it with data on consumption and export of grain and received

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1. Note Production = sown area x yield therefore 1.19 = 1.09 x 1.09
2. See V.G.Groman, Khlebnaya produktsiya i khlebnyi eksport Rossii, in Entsiklopediya Russkogo Eksporta, Tom.1, Berlin 1924, pp.158, 160, 162-175.

> a difference of 19.3% for the given data. Therefore it is possible to be in complete agreement with the conclusions of Ivantsov, namely, that before the War TsSK gave the similar underestimation of sown area as it did for yield.[1]

I have already indicated that Ivantsov was personally against making the kind of crude correction which Gosplan was advocating and that his evidence particularly concerning the need of a correction to sown area was not very impressive. I will leave a discussion of the evidence of the utilisation balances until chapter 3; it should be noted that my conclusions there indicate that this source provides little justification for the adoption of such a large correction to pre-war TsSK data. Here I will conclude this section with a brief account of the thorough and detailed reply which TsSU gave to Strumilin's claim. The reply was in an article written by N.Vinogradova which appeared in the issues of the TsSU journal at the end of 1925 and the beginning of 1926[2].

In this article Vinogradova directs herself to a critique of Ivantsov's work. She points out that Ivantsov was incorrect to treat zemstvo statistics as a homogeneous category because they employed many different methods of collecting and working out statistical data. Rather than comparing all zemstvo data with all TsSK data it was, she claimed, necessary to group the zemstvo data according to its method of collection and only to compare it with the TsSK data. Vinogradova

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1. S.G.Strumilin, K reforme urozhainoi statistiki, in Plan.Khoz., 1924, No.4/5, Ekon.Obozr., 1924, No.9/10, subsequently reprinted in Na khozyaistvennom frontye, M.1928 and 1959, Statisticheskiye Ekonomicheskie Ocherki, M.1958, and vol.1 of Izbrannye proizvedeniya, M.1963.

2. N.Vinogradova, Russkaya Urozhainaya Statistika, V.S., 1925, No.10-12 and V.S. 1926, No.1-6.

herself carried out such a detailed differentiated analysis for rye yields in seventeen provinces for all the available years. For each of these provinces the zemstvo data collected by different methods were compared with the TsSK data and the index of comparison was noted according to the method of collecting the data. The results of this comparison are given in the following table.

The average yield of Winter Rye according to Zemstvo statistical data as a percentage of average yield from TsSK data, according to the different methods of collecting the Zemstvo data

Provinces	Years covered	Methods of collecting data by zemstvo 1	2	3	4	5	6	7
Poltavskaya G.	1901-1915	103.1			97.3			
Nizhegorod-skaya	1892-1901	107.7			96.4			
Vladimirskaya G.	1896	99.7			98.2			
	1898-1900	102.5			97.3			
	1902-1903	103.7		102.6				
	1905	98.4				85.4		
Orlovskaya G.	1896-1900	105.2	111.1			90.2		
	1905-1910	131.1				90.4		
	1911-1913	99.1				89.7		
Yaroslavskaya G.	1898-1901	101.9	114.3			88.8		
	1902-1909	92.4	113.3	95.5				
	1912-1915					87.0		99.2
Tverskaya G.	1908-1909		104.0	106.3		88.7		
Ufimskaya G.	1899-1903	100.2				83.1		
	1904-1912			98.0				
Kostromskaya G.	1909-1911	101.0		106.9		96.2		
Penzenskaya G.	1909-1913		116.9				100.0	
	1912-1913	116.2	122.9				104.1	
Samarskaya G.	1911-1915	115.3					93.2	
Saratovskaya G.	1903-1905		114.0				95.0	
Simbirskaya G.	1910-1912		120.7	111.7				
Tulskaya G.	1910-1912		115.8	93.9			86.0	
Voronezhskaya G.	1886-1909		102.0					
	1886-1892		103.0					
Moskovskaya G.	1886-1910		103.0					
	1885-1882		115.0					
Chernigovskaya G.	1904-1910		106.0					
Poltavskaya G.	1886-1892		116.0					
	1892-1900		100.0					

Source: N.Vinogradova, "Russkaya urozhainaya statistika", V.S. 1926 No.1-6, p.88.

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The methods of collecting zemstvo statistical data which were listed were the following:

1. Subjective evaluation of correspondents
2. Data from correspondents covering their own households
3. Investigation by questionnaires conducted by correspondents
4. Investigation by questionnaires carried out partly by correspondents and partly agents of the administration
5. Investigations by questionnaire carried out by agents of the administration
6. Subjective evaluations of volost authorities and village elders
7. Expeditionary investigations

It will be readily seen from these data that the data collected by the correspondents network are higher than that collected by the agents of the local administration or by expeditionary investigations. And that the data collected by the correspondents concerning their own households are the highest. This is very much the kind of situation which we would have expected.

Vinogradova's own conclusions are as follows:

> If it is accepted that the correspondents' data in general might be a little high, then from all the given data it convincingly follows that the data of TsSK describe a level of harvest very close to reality[1].

Vinogradova's work and her conclusions which she clearly made from it, should in my view be accepted in preference to some conclusions

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1. N.Vinogradova, 'Russkaya urozhainaya statistika', V.S. 1926, No.1-6, p.90 (emphasis in original)

which Ivantsov did not make but which Strumilin and Groman claimed that he did.

Although Vinogradova's work has been largely ignored by the statisticians of Gosplan SES (Strumilin and Groman), and by Groman's admirers abroad (N.Jasny), this work was held in high regard within TsSU and amongst some of the leading economists in NKZem. The distinguished economist A.L.Vainshtein accepted Vinogradova's results and wrote at the time that they were particularly important given the current (1927) tendency to apply very substantial corrections to all grain statistics[1]. We will return to this in a later section.

The current Soviet historian A.S.Nifontov has also taken a fresh approach to the reliability of this data for a slightly earlier period and has concluded in a veign similar to Vinogradova's:

> The study of the literature on this question, an acquaintance with the realities of the pre-reform Russian methods of calculating average yields for separate provinces and with the stages of development of harvest statistics, a comparison of the materials on harvests according to the data of different organisations and for different provinces on the scale of large economic regions of the country, leads us to conclude that the official harvest statistics are fully worthy of investigators serious attention. There is no basis to deny that these materials are related to the real position in agriculture. In particular there is no basis to consider the harvest data of the MVD as having particularly great insufficiencies[2].

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1. A.L.Vainshtein, Plan.Khoz.,1927, no.7, p.48
2. A.S.Nifontov, Zernovoye proizdovstvo Rossii vo vtoroi polovinye XIX veka, M.1974, pp.78-79.

Finally as concerns the evidence of the utilisation data, the list of available grain utilisation balances for the immediate pre-war period, reproduced in the later section illustrates that the existence of a balance per se is no indication of the reliability of the data. The important question is the reliability of the separate parts of the data that go together to make the balance and in particular our knowledge of the state of stock changes and fluctuations in the level of livestock feed norms. These latter two elements were always the most volatile, and as explained above our knowledge of their magnitudes in individual pre-revolutionary years is extremely small.

At this time the reliability of the utilisation data was so low that it is possible to create a whole number of balances to support a variety of production data. It cannot therefore be argued that the balances support any individual series of production data.

b) The reliability of grain statistics 1914-17

The agricultural census of 1916 was a great success for the Zemstvo statisticians. It proved that they could effectively organise themselves for a complex operation covering the entire Empire, and that they could fairly rapidly process the results. The results as far as grain sown area was concerned, showed however that some of the criticisms which had been made about the reliability of the TsSK grain sown area data were unjustified. The results of the 1916 agricultural census more or less confirmed the scale of grain sowings indicated by the earlier TsSK data[1]. No TsSK figures are available for grain sown area in 1916, but if we compare the TsSK data for 1915 with the census data for 1916, there are no major unexpected discontinuities[2]. The major criticism that has been levied against the earlier TsSK sown area grain data after comparing them with the results of the 1916 census is that the TsSK data may have failed to indicate the rapid shift from spring to winter wheat sowings that was occurring just before the war[3].

Despite the undoubted deterioration in peasant attitudes by 1917 the results of the 1917 census also appear to be quite comparable with those from earlier sources.

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1. This was very different to the state of affairs for livestock statistics where the Agricultural census indicated a level of livestock considerably in excess of that indicated by the TsSK data (See A.L.Vainshtein, Iz istorii predrevolyutsionnoi statistiki zhivotnovodstva, in Ocherki po istorii statistiki SSSR, No.3, M.1960, pp.86-115).

2. This should be compared with the position for livestock. See p.123-5

3. See V.P.Timoshenko, Agricultural Russia and the Wheat Problem, Stanford, 1932, p.154.

In the table below I have presented the TsSK data for grain sown area in 1913-1915 with the census data for 1916 and 1917, in comparable regional groupings.

Grain sown area in mln.hectares from TsSK sources 1913-1915 and from the results of the agricultural censuses for 1916 and 1917

		NCR	SPR	CPR	EPR	USSR-SCR
TsSK data	1913	12.98	34.39	27.56	15.50	90.43
	1914	12.91	34.58	27.50	15.96	90.95
	1915	12.50	33.36	27.29	15.82	88.97
Census data	1916	10.82	28.83	24.84	16.31	80.80
	1917	10.64	27.51	24.86	11.93	74.94

Sources: See appendix

As the results of the 1916 census indicated a level of grain sowing about 10% lower than the 1915 level, the zemstvo statisticians would have had to claim that there had been a 20% decline in sowings between 1915 and 1916 if they were to persist with the claim that the TsSK data under-estimated reality by 9% while their data were a correct reflection of reality. Later as we shall see below Groman was to claim that both the early TsSK data and the census data underestimated reality by 9% for grain sowings[1]. However this is based on the belief that the TsSK and census data are comparable and that the former required a 9% correction for the reasons explained and refuted in our earlier chapter.

Being somewhat more detached than Groman and the other zemstvo statisticians I cannot rule out the possibility that the census data might have provided an indication of the level of grain sowings with a larger degree of under estimation than had the TsSK data. This I think is especially possible in 1917 when the extent of peasant distrust

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1. See V.G.Groman, 'Khlebnaya produktsiya i khlebnyii eksport Rossii', in Entsiklopediya russkogo eksporta, Tom 1, Berlin 1924, pp.174-75.

would undoubtedly have grown. This of course does not imply that the zemstvo statisticians were less efficient at evaluating the level of sowings than were the TsSK, but rather that they faced a more difficult task. While stating that the census data might suffer more from under-estimation than the TsSK sown area data I would still claim in line with the arguments in Chapter one that the overall level of pre-war under-estimation was probably significantly less than 9%

As regards the argument that the census must have been more reliable than the TsSK data because it gave a more full indication of the level of livestock, I must point out the exact purpose for which these statistics were being gathered.

The government was at this time primarily concerned with a grain levy and the levy was made on the level of grain surpluses. Surpluses were calculated on the basis of production data (sown area and yield) with deductions based on norms for sowing personal consumption and livestock feed. A rational and cunning peasant intent on minimising his levy would have an incentive to under-estimate his level of grain production and over-estimate the level of consumption of his household. He would consequently have no incentive to conceal his level of livestock. In fact quite the opposite. If he concealed his livestock the statisticians would not allow him to offset a normed quantity of livestock feed in their calculations of his surpluses. He was also unlikely to under-estimate the number of people in his household as this would increase the evaluation of his surplus. His sown area evaluation was likely to be under-estimated but less than that of his level of yield. The level of sown area was in any case more difficult to conceal than the level of yield. And a high sown area evaluation did at least have the slight

compensation of allowing a large quantity of seed to be offset from the evaluation of his surplus.

Of course it could be debated to what extent the cunning Russian peasant acted as a rational man and was aware of the system of evaluating his surpluses. But I think it would be dangerous to underestimate him on this.

From what I have said above we may expect the reliability of the yield data to be lower than that for sown area in this period and especially after 1916. The task of getting reliable yield data from the peasants could certainly be expected to be much more difficult, and at this time there was little way of providing a control on this. As explained above the reliability of the utilisation data was at this time far too low to be of any practical use as a control on the level of production for the country as a whole. The best that we can do is to examine the different levels of yield as indicated by different sources, to see how these differences changed over time, and attempt to give an explanation of these changes and differences.

A comparison of the available TsSK, Ministry of Agriculture correspondents data and the zemstvo data (later, under Popov, the data of the Department of census statistics of the Ministry of Agriculture) is given below:

	Rye	Wheat Winter	Wheat Spring	Oats	Barley	Millet	Buck-wheat	All
Year								
1909/13								
Min.Agr./TsSK	111.1	107.2	115.3	107.3	108.4			
Min.Agr./Zemstvo	103.0	99.3	108.9	105.0	100.0			
1916								
Min.Agr./Zemstvo	119.3	108.1	141.6	114.3	120.0	143.1	130.6	
1917 preliminary								
Min.Agr./Zemstvo	112.9	104.4		104.5	110.9	117.5	116.6	108.4

Sources: 1909/13: Materialy k prodovolstvennomu planu, Urozhai khlebov v Rossii v 1916g., Petrograd 1916 P.Rumyantsev (ed.) p.viii

1916: P. Rumyantsev (ed.) ibid., p.ix.

1917: preliminary: A.E.Lositsky (ed.) Urozhai khlebov v Rossii v 1917g., M.1918, p.9.

This presents a far more complex picture which is hard to interpret since we are given no indication of the methods employed by the individual zemstvo to collect its data.

Another piece of evidence of the changing reliability of the different sources of grain yield data during the war period, comes from the tables of the yield evaluations and calculations from different sources for Winter Rye in Kazan Gubernia which was drawn up by the distinguished Soviet statistician B.S.Yastremskii to illustrate the relationship between preliminary subjective, final subjective and actual yields in connection with his work on calculating a series of scales to convert subjective evaluations into physical terms[1]. In the following table I have converted all of Yastremsky's data into tsentners per hectare and have used the converted physical quality yield figures which he proposed for the sources initially given in subjective (five point) terms.

The yield of Winter Rye in Kazan 1902-1920 from various sources, converted into tsentners per hectare

Year	Correspondents data	Subjective Evaluations of GSK		Correspondents data	Subjective Evaluations of GSK	
	data	prelim.	final		prelim.	final
1902	6.7					
1903	12.0	9.9	11.84	100	82.5	98.7
1904	13.5	11.2	13.3	100	83.0	98.8
1905	6.3	5.5	5.5	100	87.3	88.0
1906	2.7	3.4	3.1	100	125.9	116.6
1907	9.0	10.8	9.9	100	120.0	109.4
1908	10.8	9.1	10.6	100	84.3	98.5
1909	10.0	8.2	9.4	100	82.0	94.0
1910	6.6	5.8		100	87.9	
1911	3.4	4.5		100	132.4	
1912	11.7	10.2		100	87.2	
1913	10.6	9.1		100	85.8	
1914	7.2	6.1	6.7	100	84.7	93.7
1915	10.3	10.8	10.6	100	104.9	103.3
1916	10.0	11.2	10.2	100	112.0	102.0
1917	6.7	7.8	6.3	100	116.4	93.9
1918	9.1	11.8	9.4	100	129.7	103.7
1919	5.4	8.8	6.3	100	163.0	116.6
1920	2.8	3.4	2.8	100	121.4	100.0

Source: complied from B.S.Yastremskii, Kolichestvennoye vyirazhenie subyektivnoi kharakeristiki urozhaya, V.S., 1922, no.5-8, this article has been reprinted in a collection of Yastremsky's works B.S.Yastremskii, Izbranniye Trudyi, M.1964, pp.290-326. The data referring to the yield of winter rye in Kazan from the different sources appear on pages 291 and 296.

These data indicate that in the pre-war period the correspondent's data were generally higher than the converted subjective evaluations of the GSK. And that the final subjective evaluation of the latter were normally higher than the preliminary subjective evaluations. Exceptions occurred to this rule for years of very low harvests in 1906 and 1911. and also in the year following the very low harvest of 1906. These exceptions could be explained in terms of the voluntary correspondents only having an interest in giving a low indication of the harvest in

times when the local authorities were likely to issue relief. In less catastrophic years the voluntary correspondents would have no incentive to distort the picture one way or the other, and since the correspondents undoubtedly came from the more literate group of farmers we would expect their indications of the level of yield to be higher.

This position changed during the war. The position in 1914 corresponded to the standard pre-war picture. But by 1915 we see a slight reversal as for the first time in a year not associated with a poor harvest the correspondents' evaluation of the harvest is lower than the subjective evaluations of GSK. Also for the first time the GSK preliminary evaluation is higher than its final evaluation. There are two new characteristics in these data which are to become much more marked in the later years of the war and war communism. By 1916, the first year when an attempt was made to impose a grain levy under the Tsarist Minister of Agriculture, the GSK preliminary subjective evaluation was 12% higher than the correspondents' evaluation.

Lest it be argued that the 1916 harvest had already been evaluated before the move towards a grain levy had been decided, it is useful to note the comments which P.Rumyantsev, the editor of the special council's report on the 1916 harvest made on this point:

> In many localities the weather at harvest time was unfavourable and had a bad effect on the quality and quantity of grain harvested. This produced an excessively pessimistic evaluation of the harvest on the producers. There were also several other factors which contributed towards the same effect. These were based on the specific circumstances of the time: uncertainty as to when the war would end, whether

> there would be a continued loss of labour force, food provisioning problems, the setting of a fixed price for grain, rumours about requisitioning, etc. All this must certainly have led to a tendency to lower the indications of the size of the harvest[1].

By 1917 this gap had risen to 16.4% and then in 1918 and 1919 as the experiences of requisitioning grew, this gap widened to 30% and 63%. The fall in the gap in 1920 was probably associated with the extremely low evaluation which was being made at the time by the local statisticians.

These figures strikingly reveal the increased problems involved in getting reliable yield data from the peasants at this time and the fundamental change in the reliability of the data which was being received. Clearly these data must be treated with the greatest degree of caution.

These problems were well known and appreciated at the time by the statisticians working on the problem of current evaluation of the harvest. Among these statisticians the practice developed of using the preliminary subjective evaluations of the harvest prospect, as these were the ones less likely to be suffering from distortion. This practice became institutionalised within TsSU in the early years of the 1920s, as will be described later, but it was already well established in these war years. Although I have stated that the utilisation data of this period were so unsatisfactory that they could serve only

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1. P.Rumyantsev, Urozhai khlebov v Rossii v 1916g., Petrograd 1916, p.ix. This work was published in November 1916. The emphasis given above is mine.

as an extremely rough check on the production data, it is worthy of note that in constructing the first serious grain forage balance for Russia in 1917, Lositsky used the preliminary harvest evaluations[1].

In his introduction Lositsky explains the reason for his use of the preliminary data as being due to the fact that the final data would not have been available until the beginning of January 1918[2]. At this time Lositsky was confidently looking forward to using this final data once they became available.

The final evaluations of the 1917 harvest have never been published and Lositsky never made his revision. But if the Kazan data are at all typical, the final evaluation may have been 20% lower than the preliminary evaluation. Such a revision if accepted as correct would seriously affect the validity of contemporary analyses of the situation. But it is generally agreed that such a revision would produce a greater level of peasant distortion.

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1. See A.E.Lositsky, Urozhai khlebov v Rossii v 1917g., M.1918, pp. 5 and 7.

2. In the main body of the text on page 7 Lositsky states that the final results were due to be ready by December 10, 1917. But in the introduction to this book (page 5) written in December he states that the final results would only be available in January 1918.

3. Grain utilisation by item

In order to assess the reliability of the different grain utilisation balances it is necessary to consider separately all the different elements in the balance. It is necessary to consider the sources of data for each of these separate elements and the nature of the available data on these elements. It is desirable also to get some impression of the elasticity of demand for the given element - i.e. to assess the sensitivity to the availability of grain of the utilisation of grain for any specific purpose. In the sections below I will be considering in turn the utilisation of grain for each of its main purposes:

a) for use as seed

b) for personal consumption,

c) for livestock feed,

d) for industrial use,

e) for the army,

f) for changes in stock levels

g) for exports,

h) for losses.

Apart from these sections dealing more or less strictly with utilisation there will be a further section which will very briefly review the available data concerned with distribution:

i) transportation data.

In this chapter I will be primarily concerned with the data that are relevant to the historical period covered in part one of the thesis. Many of the sources will be historically distinct and our knowledge of them will be totally dependent on the data collected and processed at the time. But other data are less historically distinct. Our knowledge of personal grain consumption and livestock feed norms as derived from the extensive studies of the 1920s can certainly improve our understanding of pre-revolutionary grain consumption and feed norms. This does not mean that the level of these norms was the same in both historical periods. It just means that our knowledge of the earlier norms is so slight that the later data can help fill in many of the areas of uncertainty. In particular the regional coverage of pre-war personal consumption and feed norms was very poorly known and can well serve to be supplemented by later data.

In this thesis the data have been primarily presented according to the chronology of when they were produced and when they refer to. But since some of the data collected and worked out in the 1920s is of relevance to our understanding of pre-war consumption, the conclusions from some of these later analyses will be cited in the present chapter.

a) Grain utilisation as seed

Seed is an indispensable use of grain if the further production of grain is to continue. As agriculture becomes more advanced the share of grain used as seed declines. This decline is primarily due to the increase in yield per unit of seed sown. However it is partly due also to lower seeding rates per unit area, the latter being a consequence of the substitution of mechanical seeding drills for the more wasteful hand broadcast system of sowing. The amount of grain sown per area

differs for different grains, for different technologies and for different areas. It differs according to whether we are measuring it by weight or by volume and also differs to some extent according to the availability of grain and the recommended sowing norms.

The quality and variety of the grain used as seed is also an important matter. It had always been realised that the best results came from sowing the best grain as seed. But specialised selection farms were not developed in Russia on any scale until the end of the nineteenth century and special selected seeds only began to be widely used amongst the peasantry from the 1920s. Here I will be mainly concerned with the quantitative aspects of the use of seed.

The magnitudes of local traditional seeding rates were very well known. They did not begin to change much before the introduction of special seeding machines and of more specialised seed types, which did not come about until after the period being studied in this chapter. The statisticians in GSK, the police agents, the local elders, the Ministry of Agriculture correspondents and the zemstvo statisticians were all able to collect data and supply reports indicating fairly reliably what the locally established seeding rates were. These were traditionally measured in terms of volumes of seed per unit area (chetvert per desyatina). Later, from the beginning of the twentieth century they were measured in terms of weights of seed per unit area (pds per desyatina or tsentners per hectare)[1]. There was little controversy over the size of the seeding rate. There was, however, particularly in the 1920s, considerable controversy over the size of the area

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1. The conversion of volume measures into weight measures is complicated because of the different densities of the different grains and is therefore highly dependent on the product mix.

that was actually sown and that which had been sown before the war. And this of course had a direct effect on the quantity of grain used as seed. The question of the size of sown area has already been discussed above.

In this section I will consider first the proportion of grain used as seed throughout this period, for the different regions, for the different grains and the different producers. I will then consider the quantity of grain used as seed per sown area. In the final part of this section I will consider the available evidence on the annual fluctuations in the quantity of grain used as seed, as a consequence of strain on the availability of grain.

Assuming that the amount sown did not change very rapidly from year to year the average yield (v samakh) in units of seed sown would approximate to the inverse of the proportion of harvested grain used as seed. Fairly reliable indicators of the yield/seed ratio and therefore of the seed to yield ratio are available for production of rye in the 50 provinces of European Russia from the beginning of the nineteenth century. They are given below:

Rye Production and Utilisation as seed in European Russia

	Yield/seed ratio	Proportion of rye used as seed (%)
1801-10	3.52	28.4
1811-20	3.54	28.2
1821-30	3.41	29.3
1831-40	3.44	29.1
1841-50	3.60	27.8
1851-60	3.55	28.2
1861-70	3.70	27.0
1871-80	3.91	25.6
1881-90	4.27	23.4
1890-1900	4.79	20.9
1901-10	5.22	19.2
1911-14	5.69	17.6

Source: V.G.Mikhailovskii, Byulleten TsSU, No.50, 1921, cited here from A.V.Chayanov, (ed.), Problemy Urozhaya, M.1926, p.35.

The changes in the proportion of grain used as seed in the different regions of Russia throughout the nineteenth century are given in the following table:

Years	NCR	SPR	CPR	EPR	Russia	Russia Mikhailovskii data
1802/11	34.0%	26.8%	28.2%	33.6%	30.4%	28.4%
1841/50	35.9%	26.9%	29.2%	28.7%	30.7%	27.8%
1851/60	37.6%	28.1%	30.0%	29.1%	31.6%	28.2%
1861/70	34.6%	27.9%	27.3%	31.8%	29.9%	27.0%
1871/80	31.9%	26.4%	25.3%	28.7%	27.5%	25.6%
1881/90	29.2%	20.0%	23.4%	28.2%	24.4%	23.4%
1891/1900	26.2%	16.7%	21.4%	23.1%	21.1%	20.9%

Source: Kovalchenko and Nifontov's data see appendix.

The proportion of grain used as seed fell by 8-9% points during the nineteenth century. Nearly all of this fall came in the second half of the nineteenth century as there was a rise in the share of grain used as seed in most regions in the first half of the century. And the fall in proportions of grain used as seed was fairly evenly distributed between the different regions.

The decline in the share of grain used as seed affected all grains. In the 1850s the proportion of spring grains used as seed was about 4% higher than the proportion of winter grains so used. And by the 1890s despite a 33% fall in overall proportions of grains used as seed the share of the spring grains was still 3% higher than the winter grains:

Years	Winter grains	Spring grains	All
1851/60	29.1%	32.8%	31.3%
1861/70	28.3%	30.6%	29.7%
1871/80	24.8%	29.4%	27.5%
1881/90	21.9%	26.0%	24.3%
1891/1900	19.5%	22.0%	21.0%

Source: A.S.Nifontov's data, see appendix

Note: The Winter grains are mainly Winter Rye and Winter Wheat, the Spring grains are mainly the rest. These proportions are according to the volume of grain sown (i.e. chetvert). This gives a higher share for Oats and Barley (Spring grains) than would a ratio based on weights.

Generally the peasants sowed a larger quantity of grain per unit area on their allotment lands than did the private owners on their own land. For Winter Rye the difference was as much as 6%, but for most other grains the difference was less. To some extent some of these differences could be explained in terms of there being a higher proportion of private estates in the Ukraine where seeding rates were lower anyway. But an analysis of the regional data indicates that even within the same region seed rates on the peasant allotments were higher than on the private lands. See table below and in the appendix. The difference is likely to be explained in terms of the private lands having a more efficient system of sowing and using more seed drills.

Grain sowing rates in chetverts per desyatina for different types of producer. Average data for 1880-1900.

	NCR	SPR			CPR			All
		Novoross.	Yug. Zap.	Maloross.	C. Zem.	N. Volz.	Sr. Volz.	
Winter Rye								
priv	9.3	5.6	8.1	7.5	8.0	6.0	8.0	8.1
al	9.6	5.5	8.6	7.6	8.4	6.0	8.6	8.6
Winter Wheat								
priv	8.4	5.5	8.1	7.7	8.0	-	8.0	7.9
al	8.6	5.3	8.4	7.3	8.2	-	-	8.0
Spring Wheat								
priv	9.2	5.9	8.6	7.3	8.0	7.0	8.9	8.2
al	9.4	5.5	8.7	7.4	7.7	7.6	9.2	8.3
Oats								
priv	17.8	9.4	14.1	17.4	15.2	12.9	15.2	15.7
al	19.2	8.9	14.6	12.5	16.1	13.7	16.0	16.7
Barley								
priv	10.3	7.0	9.4	8.9	9.2	8.8	10.9	9.7
al	11.0	6.6	9.7	9.1	9.4	7.7	11.5	10.1
Buckwheat								
priv	7.8	-	7.9	6.3	7.8	-	7.7	7.1
al	8.0	-	8.0	6.8	8.0	-	8.0	7.7
Millet								
priv	-	1.7	2.1	7.2	1.7	-	1.5	1.8
al	-	1.6	2.2	2.3	1.8	-	1.7	1.9

Source: Svod.stat.svednii... Vyp 1, SPb 1902, pp.144-47.

Note: priv = private land, al = Allotment land (peasants)

Despite the lower seeding rates the private lands had higher yields in volume per desyatina. Their yields in sam were consequently even higher and so their share of grain production that they used as seed was consequently that much less.

	Sowings in chet/des		Yield in chet/des		Yield in sam		% grain production used as seed	
	Priv.	Allot.	Priv.	Allot.	Priv.	Allot.	Priv.	Allot
W.Rye	8.1	8.6	48	40	6.0	4.7	16.7%	21.3%
W.Wheat	7.9	8.0	46	39	5.7	5.0	17.5%	20.0%
S.Wheat	8.2	8.3	39	35	4.8	4.2	20.8%	23.8%
Oats	15.7	16.7	68	58	4.5	3.7	22.2%	27.0%
Barley	9.7	10.1	50	44	5.2	4.5	19.2%	22.2%
Buckwheat	7.1	7.7	32	29	4.4	3.9	22.7%	25.6%
Millet	1.8	1.9	36	33	20.8	18.3	4.8%	5.5%

Source: Svod.stat.svedenii po Sel.khoz.Rossii k kontsu XIX veka, vyp 1, SPb 1902, pp.146-47.

The average pre-war sowing rates per hectare of land for the different grains and the different regions in the decade before the war are given in the following table:

Regions	W. Rye	W. Wheat	Sp. Wheat	Barley	Oats	Millet	Buck-wheat	All
1.NCR	1.54	1.53	1.56	1.69	2.04	0.20	1.17	1.71
2.SCR								
3.SPR								
a)Ukr.	1.30	1.32	1.29	1.33	1.42	0.46	1.15	1.29
b)S.Kav.	1.18	1.32	1.29	1.26	1.50	0.46	1.02	1.26
3.	1.29	1.32	1.29	1.32	1.44	0.46	1.15	1.29
4.CPR	1.11	1.12	1.17	1.17	1.36	0.28	0.97	1.12
5.EPR								
a.Sib.	1.35	1.47	1.62	1.68	2.08	0.39	0.93	1.73
b.Kaz	0.90	0.90	0.93	0.94	1.06	0.19	0.75	0.89
5.	1.22	1.28	1.25	1.40	1.77	0.21	0.90	1.34
USSR	1.28	1.31	1.26	1.35	1.65	0.33	1.07	1.32

Source: Trudy TsSU, Tom VIII,vyp.1,M.1921, pp.264-70 and see appendices for regional sown area data to calculate aggregates.

It will be noted from the above tables that a much larger quantity of Oats was sown per unit area than of other grains. By weight measurements the weight of Oats sown per unit area was about 25% higher than the main food grains, while in terms of volume the quantity sown per unit area was about twice as much as for the main food grains. As we shall see below the yield of Oats per unit area was also higher than for the main food grains, but not proportionately higher so its yield in sown area was actually lower.

The sowing rates of Millet, Buckwheat and Maize were much lower than those for the main food grains. These yields in volume and weight terms were also relatively low. But in terms of yield in 'sam' (per unit sown) Millet had an extremely high yield[1].

Indications of the annual level of fluctuations in the quantity of grain used as seed are available in a highly disaggregated state in Chetverikov's compilation of 1883-1915 grain statistics[2]. In a more aggregated form such indications are available by comparing annual yield data in 'sam' with annual yield data measured in volumes(chetverts) per unit sown area.

For the 50 gubernii of European Russia we see that during the years of the famine there was a slight decline in the seeding rates:

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1. This applies also for Maize.

2. See N.S.Chetverikov (ed.), Svod urozhainyikh svedenii za gody' 1883-1915 (materialy tsentralnogo statisticheskogo komiteta po urozhayam na nadelnyikh zemlyakh), M.1928

Year	Prodn in mln chet	Yield in sam	Sowings in mln chet	Sown area in mln hectare	Seed rate in chet./ hectare
1888	314.6	4.60	68.4	65.6	1.04
1889	247.1	3.63	68.1	65.4	1.04
1890	292.3	4.07	71.9	68.9	1.04
1891	228.8	3.15	72.6	69.4	1.05
1892	265.8	3.94	67.5	67.1	1.01
1893	377.5	5.69	66.4	65.8	1.01
1894	380.3	5.68	67.0	65.8	1.02
1895	347.4	5.06	68.6	64.9	1.06

Source: A.S.Nifontov data in chetverts and sam, V.M.Obukhov data in mln hectare. See appendix. Data cover 50 gubernii of European Russia.

The famine appears to have resulted in a 3.8% decline in seed rates which was important for the three years after the famine. However this is very difficult to interpret. The detailed figures available in Chetverikov's compilation indicate that this decline came about partly from an increase in the sowing of grains such as millet, which had a much lower seed rate in normal times, and that only a very small part of this observed 3.8% decline could be explained in terms of a change in seeding rates.

Instead of affecting the seed rates the effect of strain on the availability of grain appears to have resulted in the increase in sowings of those kinds of grain which have low seed rates and a fairly sharp decline in the area sown. The decline in area sown over the famine period is illustrated in the table below:

Year	Grain sown in mln.hectare C.Ch.Zem	Volga	area of USSR
1888	8.63	15.08	70.8
1889	8.60	15.13	70.8
1890	8.69	16.02	73.5
1891	8.67	15.97	74.1
1892	7.83	14.07	72.3
1893	7.68	14.46	70.9
1894	7.84	14.47	71.7

Source: See appendix

b) Data on grain used as food

The quantity of grain used as food is dependent upon: the size of the population, and the consumption pattern of the population. In as much as consumption patterns differed between urban and rural areas, fered between different regions, differed according to the level of ome of the given household and differed according to the age profile the total population, all of these elements will have to be considered. analysis of the consumption levels for different income groups will indicate how the level of consumption is likely to change with overall changes in income levels and with an increase in the relative scarcity of grain. Grain consumption should not be seen in total isolation from the consumption of other basic foodstuffs. An indication of the availability of other foodstuffs and the relative share of grain in the total diet would help indicate the possibility and possible importance of substituting grain by other food products. But such an examination cannot be included within the scope of the current work[1]. In the following parts of this section I will discuss i) the available population data, ii) the available data on grain consumption norms.

i) The available population data

The first Russian census was carried out in 1897. It was intended to be repeated in 1915 but this was stopped by the War. A form of rural census was carried out in connection with the 1916 and 1917 agricultural censuses, and a registration of the town population occurred after 1916 in connection with rationing. Before these censuses, a more primitive form of head count the 'reviziya', was made periodically (about once

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1. A preliminary account of all the elements in the diet is available in S.G.Wheatcroft SIPS No.2, Birmingham University, 1976, pp.93-6.

every 15 years since the time of Peter the Great). It was the 'revizii' which had initially served as the basis for the Poll tax, and for the registration of military conscripts. The 'revizii' and subsequent censuses were supplemented by registration data on births and deaths collected by the Church Authorities in the so-called 'Metric' books, other registration data on migration eastwards were rather incompletely kept by the immigration offices in certain Siberian and Asiatic steppe towns.

The early 'revizii' data have recently been analysed by the Soviet historian Kabuzan, on a regional basis[1]. Early TsSK regional population data are available for the beginning of the nineteenth century in Kovalchenko's work and from 1850 in Nifontov and Pronin's work for European Russia and Siberia. From 1871 these data are available on a regional and urban/rural breakdown from Zaitsev. Volkov provides a very useful computation of the early data from 1850 into an area comparable with the post-revolutionary area of the USSR, estimating the population of the non-European territories, giving a breakdown according to urban and rural location and giving separate figures for the army during the 1914/18 period[2].

After considering the pre-war population data and the wartime population data, I will briefly discuss the available data which give a breakdown of the population according to the different types of producer.

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1. See V.M.Kabuzan, Narodnonaseleniye Rossii v XVIII-pervoi polovinye XIX v., M.1963.

2. I.D.Kovalchenko, ibid., M.1967. A.S.Nifontov ibid., M.1974, V.Zaitsev, K voprosu o chislennosti naseleniya Evropyeiskoi Rossii, in V.G.Groman (ed.), Vliyaniye neurozhaev na narodnoe khozyaistvo Rossii, chast 2, M.1927, M.1927 pp.66-90, and E.Z.Volkov, Dinamika naseleniya SSSR za vosemdesyat let, M.1930.

Pre-war population data

Kovalchenko's data cover just the rural population of 48 of the 50 gubernia of European Russia (i.e. all apart from Ufimskaya G., and Bessarabskaya G.). The regionalisations used by Kovalchenko and the basis upon which they have been converted into my major regionalisations have been described in the appendix. Kovalchenko's figures are given in the following table:

Region	Rural population in mln. 1802-11	1841-50	1851-60	Rural population in %% 1802-11	1841-50	1851-60
NCR	14.33	17.11	16.92	100	119.4	118.1
SPR Ukraine	8.66	11.64	12.17	100	134.4	140.5
CPR	11.17	15.26	16.25	100	136.6	145.5
EPR Urals	2.98	5.02	5.71	100	168.5	191.6
All [illegible]	37.14	49.03	51.05	100	132.0	137.5
Baltic States	1.20	1.58	1.63	100	131.7	135.8
All inc.Baltic States	38.34	50.61	52.68	100	132.0	137.4

Source: I.D.Kovalchenko, ibid., M.1967, pp.78, 386
(See appendix)

From the table it is readily visible that the NCR is growing at a much lower rate than all other regions. The Urals were growing at the fastest rate followed by the CPR. Within the CPR the population in the lower Volga was growing much more rapidly than the population in the more traditionally established areas of the Central Chernozem and Central Volga.

Nifontov's data cover the second half of the nineteenth century for European Russia and Siberia provide the following indication of population growth:

Region	Population in millions					Average Annual growth rate of Population				
All population	1850s	1860s	1870s	1880s	1890s	1860s /1850s	1870s /1860s	1880s /1870s	1890s /1880s	1890s /1850s
NCR(N)	19.42	20.39	22.23	25.37	29.51	0.5	0.9	1.4	1.6	1.3
SPR(N)	14.57	16.46	18.32	22.42	28.12	1.3	1.1	2.2	2.5	2.3
CPR(N)	19.36	20.42	22.37	26.19	29.22	0.5	1.0	1.7	0.8	1.2
EPR(N)	4.16	4.52	4.64	5.52	6.07	0.9	0.3	1.9	1.0	1.2
EPR(N+P)	6.99	7.73	8.66	10.21	11.81	1.1	1.2	1.8	1.6	1.7
USSR(N)	57.51	61.79	67.56	79.50	91.92	0.7	0.9	1.8	1.6	1.5
USSR(N+P)	60.34	65.00	71.58	84.19	97.66	0.8	1.0	1.8	1.6	1.5
Baltic	1.76	1.91	2.10	2.26	2.39	0.9	1.0	0.8	0.6	0.9
All incl. Baltic	59.27	63.70	69.66	81.76	94.31	0.7	0.9	1.7	1.5	1.5
Rural Population										
NCR(N)	17.06	17.67	19.22	21.35	24.65	0.4	0.9	1.1	1.5	1.1
SPR(N)	12.99	14.53	16.03	19.20	24.38	1.2	1.0	2.0	2.7	2.2
CPR(N)	18.03	18.85	20.60	24.11	25.78	0.5	0.9	1.7	0.7	1.1
EPR(N)	4.04	4.35	4.59	5.28	5.81	0.8	0.6	1.5	1.0	1.1
USSR(N)	52.12	55.40	60.44	69.94	80.62	0.6	0.9	1.6	1.5	1.4
Baltic	1.56	1.67	1.78	1.85	1.79	0.7	0.7	0.4	-0.3	0.4
All incl. Baltic	53.68	57.07	62.22	71.79	82.41	0.6	0.9	1.5	1.5	1.3
Urban Population										
NCR(N)	2.36	2.72	3.01	4.02	4.86	1.5	1.1	3.4	2.1	2.6
SPR(N)	1.58	1.93	2.29	3.22	3.74	2.2	1.9	4.1	1.6	3.4
CPR(N)	1.33	1.57	1.77	2.08	2.44	1.8	1.3	1.8	1.7	2.1
EPR(N)	0.12	0.17	0.05	0.24	0.26	4.2	-7.1	+48.0	+8.3	2.9
USSR(N)	5.39	6.39	7.12	9.56	11.30	1.9	1.1	3.4	1.8	2.7
Baltic	0.20	0.24	0.32	0.41	0.60	2.0	3.3	2.8	4.6	5.0
All incl. Baltic	5.59	6.63	7.44	9.97	11.90	1.9	1.2	3.4	1.9	2.8
Urban Population as % of all										
NCR(N)	12.2	13.3	13.5	15.8	16.5					
SPR(N)	10.8	11.7	12.5	14.4	13.3					
CPR(N)	6.9	7.7	7.9	7.9	8.6					
EPR(N)	2.9	3.8	1.1	4.3	4.3					
USSR(N)	9.4	10.3	10.5	12.0	12.3					
Baltic	11.4	12.6	15.2	18.1	25.1					
All incl. Baltic	9.4	10.4	10.7	12.2	12.6					

Source: A.S.Nifontov, ibid., M.1974, pp.200,286,287. (see appendix)

These tables vividly indicate the increasing rate of population growth in the second half of the nineteenth century. The fastest growth rates are in the SPR and the EPR. The CPR had experienced a rapid growth in population until the 1890s when its rural growth rate was more than halved (from 1.7% per year to 0.7% per year).

Finally I am presenting a further series of regional population data covering the period from 1880-1915. This series is required to be compatible with the annual regional production data that I am using for this period . This series of data covers an area roughly comparable with the pre-1939 area of the USSR. The main outlines of these data are given in the table below in comparison with the all USSR data supplied by Volkov:

All population in approximate pre 1939 area of USSR

Year	NCR	SCR	SPR	CPR	EPR	USSR	Volkov USSR
1880	21.47	4.81	22.16	20.59	10.94	79.97	78.59
1885	22.67	5.38	23.33	22.22	11.76	85.36	84.95
1890	24.07	6.09	25.88	24.26	13.07	93.39	92.82
1895	25.52	6.91	28.44	25.37	14.52	100.76	100.28
1900	27.23	7.69	31.31	27.37	16.27	109.87	109.59
1905	29.13	8.30	34.70	30.09	18.42	120.64	120.08
1910	30.82	9.10	37.56	32.30	21.27	131.05	130.35
1914	32.56	9.76	40.54	34.87	23.40	141.13	139.91
Average annual growth rate							
1885/80	1.1%	2.4%	1.1%	1.6%	1.5%	1.3%	1.6%
1890/85	1.2%	2.6%	2.2%	1.9%	2.2%	1.9%	1.9%
1895/90	1.2%	2.7%	2.0%	0.9%	2.2%	1.6%	1.6%
1900/1895	1.3%	2.3%	2.0%	1.6%	2.4%	1.8%	1.9%
1905/00	1.4%	1.6%	2.2%	2.0%	2.6%	2.0%	1.9%
1910/05	1.2%	1.9%	1.6%	1.5%	3.1%	1.7%	1.7%
1914/10	1.4%	1.8%	2.0%	2.0%	2.5%	1.9%	1.8%
Rural population (unadjusted)							
1880	17.21		(19.31)	18.93			68.13
1885	18.29		(20.25)	20.43			73.91
1890	19.49		(22.49)	22.33			81.01
1895	20.75		(24.75)	23.33			87.77
1900	22.16		(27.19)	25.16			95.53
1905	23.77		(30.17)	27.66			103.59
1910	25.19		(32.73)	29.69			111.77
1914	26.67		(35.45)	32.10			119.47
Urban population (unadjusted)							
1880	4.26		(2.85)	1.66			10.16
1885	4.38		(3.08)	1.79			11.01
1890	4.58		(3.39)	1.95			11.82
1895	4.77		(3.69)	2.04			12.50
1900	5.07		(4.12)	2.21			14.06
1905	5.36		(4.53)	2.43			16.50
1910	5.63		(4.63)	2.61			18.59
1914	5.89		(5.09)	2.77			20.45
% Urban to all population (unadjusted)							
1880	19.8		(12.9)	8.1			12.9
1885	19.3		(13.2)	8.1			13.0
1890	19.0		(13.1)	8.0			12.7
1895	18.7		(13.0)	8.0			12.5
1900	18.6		(13.2)	8.1			12.8
1905	18.4		(13.1)	8.1			13.7
1910	18.3		(12.9)	8.1			14.3
1914	18.1		(12.6)	7.9			14.6

Sources: See appendix for regional data compilation, Volkov's all union data fron E.Z.Volkov, Dinamika narodonaseleniya SSSR za 80 let, M.1930, pp. 264-271.

The total population data given in these tables is probably quite reliable, but the urban/rural data require quite a considerable adjustment, as is explained below. The total population data indicate the continued high growth rates of the population over this period. There are some indications of a slow-down in the growth rate in the last ten years before the war, but the rates are still very high. The growth rates of the EPR and the SPR remain the highest, although the CPR has recovered somewhat from its spell of low rates in the 1890s.

As explained in the appendix, these data come mainly from V.Zaitsev's work. Zaitsev himself explained that the TsSK registration data were very unreliable and that the urban population was sometimes registered more than once[1]. Zaitsev himself claimed that a comparison of the TsSK data and the results of the 1916/17 census indicated that TsSK had over estimated the real level of the population by 5.6%. Zaitsev apparently adjusted his figures to take account of the regional migration eastwards. But he admitted that the urban/rural division of his data gives a very misleading picture of the dynamic of urban growth:

> Our figures greatly underestimated the level of urban population for later years and over estimated it for earlier years (i.e. before the 1897 census SGW). Therefore the data on the size of the urban population should not be used directly in this form[2].

For the 50 gubernia of European Russia, Zaitsev applied the following corrections to urban population figures:

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1. A procedure existed for registering new arrivals in towns but not, apparently, departures.
2. See V.Zaitsev, in V.G.Groman (ed.) ibid., M.1927, p.61. See also A.E.Losisky, in Urozhai khlebov...,M.1917, p.29 for a similar claim.

1880	-10.9%
1885	-5.6%
1890	-3.2%
1895	-1.1%
1897	0%
1900	+3.2%
1905	+9.6%
1910	+15.4%
1914	+21.5%

Source: V.Zaitsev, in V.G.Groman (ed.), ibid., M.1927, p.65.

No differentiation was given for the level of correction to be applied in the different regions, and so this level of corrections is applied throughout for all regions. The adjusted urban and regional population figures are given in the following table:

Urban population (adjusted)

Year	NCR	SCR	SPR	CPR	EPR	USSR	Volkov USSR
1880	3.80		(2.54)	1.48			10.16
1885	4.13		(2.91)	1.69			11.01
1890	4.43		(3.28)	1.89			11.82
1895	4.72		(3.65)	2.02			12.50
1900	5.23		(4.25)	2.28			14.06
1905	5.87		(4.96)	2.66			16.50
1910	6.50		(5.57)	3.01			18.59
1914	7.16		(6.18)	3.37			20.45

Rural population (adjusted)

1880	17.67		(19.62)	19.11			66.13
1885	18.54		(20.42)	20.53			73.91
1890	19.64		(22.60)	22.39			81.01
1895	20.80		(24.79)	23.38			87.77
1900	22.00		(27.06)	25.09			95.53
1905	23.26		(29.74)	27.43			103.59
1910	24.32		(31.99)	28.93			111.77
1914	25.40		(34.36)	31.50			119.47

Urban to all population

1880	17.7%		(11.5%)	7.3%			12.9
1885	18.2%		(12.5%)	7.5%			13.2
1890	18.4%		(12.7%)	7.6			13.7
1895	18.5%		(12.8%)	8.0%			13.5%
1900	19.2%		(13.6%)	8.3%			13.9%
1905	20.2%		(14.3%)	8.5%			13.7%
1910	21.1%		(14.8%)	9.3%			14.3%
1914	22.0%		(15.2%)	9.7%			14.6%

Here we see a more acceptable picture of the dynamic of urbanization which was rapidly increasing in all regions on the eve of the war.

Population data during the war.

The figures based on the TsSK annual data only recorded the permanently registered population and not the actual 'on hand' (nalichnoye) population. It required a census to capture a picture of the 'on hand' population at any specific time. Seasonal migrant workers (otkhodniki), students, military conscripts and other people temporarily absent from their families would be registered as though they were normally present in the TsSK annual accounts. Some of these people may indeed have been doubly registered as permanently resident in towns as Zaitsev claimed[1], but most would not. In normal circumstances this discrepancy would not be too important, but during the war when the temporarily resident population had been inflated by up to 10 million refugees and up to 8 million soldiers, and when it was intended to use the population data for food supply planning purposes, the size of this discrepancy grew to enormous proportions. In these circumstances it became essential to get data more representative of the actual location of the population. This required a census. Such a census was carried out by the zemstva and town statisticians in 1916 and repeated for the rural population as part of the agricultural census in 1917. The results of these censuses are available in the works of Lositsky, Kondratiev, Volkov and Gayster[2]. Lositsky's data appear to include the army with the rural population and includes all the refugees. Kondratiev's data appear to exclude the army but include the refugees. Gayster's data appear to cover the registered rural population plus refugees. Volkov provided the most complete overall picture recalculated on an annual basis and covering

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1. See above p. 81

2. See A.E.Lositsky, Urozhai khlebov v Rossii v 1917g., M.1918, p.29 N.D.Kondratiev (compiler), Sel.Khoz Rossii v XX veke, M.1922, pp.20-21. E.Z.Volkov, Dinamika naseleniya SSSR za vosemdesyat let, M.1930 pp.104,137-7, 170-81, Gayster (ed.), Osnovniye elementy Sel.Khoz. proizvodstva SSSR 1916 i 1923-27 gg., M.1930, pp.2-5.

just the area of the future USSR in its pre-1939 boundaries. Volkov's account of the actual population balance for the war time years is given in the table below:

	1/1/ 1914	1/1/ 1915	1/1/ 1916	1/1 1917	1/1 1918
a) Actual population	139.9	142.6	142.3	142.5	140.9
Urban	20.5	21.8	23.5	24.0	25.6
Rural	119.5	120.8	118.8	118.4	115.3
b) Normal civilian population	139.9	142.0	140.9	139.7	139.0
Recruited	0.4	5.5	9.9	13.0	15.7
Actual civilian population	139.5	136.5	131.0	126.7	123.3
c) Army					
Recruited	0.4	5.5	9.9	13.0	15.7
Losses	0	0.5	2.8	5.0	7.8
Army actual size*	0.4*	5.0	7.1	8.0	7.9
of whom on active service	0	4.2	5.2	5.2	0.
of whom on non-active service	0.4	0.8	1.9	2.8	7.9
d) Refugees and others	0	1.1	4.2	7.8	9.7
e) All actual	139.9	142.6	142.3	142.5	140.9
of whom urban	20.5	21.8	23.5	24.0	25.6
of whom					
normal civilian	20.4	20.5	20.7	19.7	19.3
military	0.1	0.9	1.3	1.5	2.8
refugees etc.	0	0.4	1.5	2.8	3.5

Source: E.Z.Volkov, Dinamika naseleniya SSSR za vosemdesyat let, M.1930, p.104.

Note: These figures refer to the pre-1939 area of the USSR. The item refugees etc.would include refugees and prisoners of war. In order for the table to be consistent and avoid double counting the refugees should only include those coming from an area outside that for which these figures were calculated, i.e. coming from those occupied areas which were lost to the USSR in the 1920s and 1930s. Displaced persons living in those parts of the war zone which later were included in the USSR will have already been covered as part of the normal civilian population.

* There appears to be a mistake here. There were already about 1 million in the army before 1914, so the actual size of the army ought to be a million larger than the size indicated.

These figures show several very important developments:

First they show the large fall in the normal civilian population due to the recruitment into the army of almost 16 million men.

Secondly they indicate that almost 8 million of these soldiers were lost during the war, [illegible] as a consequence of their having died or been taken prisoner. We also see that a rising proportion of the soldiers were not on active service.

Thirdly, we see that these military losses of 8 million were totally outweighed in the covered areas in these years by the great influx of refugees and prisoners of war. By the beginning of 1918 the numbers of newcomers had risen to 9.7 million.

Fourthly we see the actual increase in urbanisation during this period, and the fact that this increase was totally the consequence of the very large increases in refugees and military personnel in urban areas. Whereas in 1914 the normal civilian population had accounted for 99.7% of the urban population, by the beginning of 1917 they accounted for only 82.1% and by the end of 1917 they accounted for only 75.4%[1] of the population.

The position was therefore much more complicated than is often realised. The problem was not only the large increase in the size of the army and its deployment primarily in the north-west of the northern consumer region, there was also the disruption and additional strain caused by a large influx of refugees into this area, with a very large proportion of them settling in urban areas.

It is somewhat difficult to give a precise regional breakdown of the location of this additional burden of soldiers and refugees. The Volkov data, which are the most detailed, have been adjusted to the pre-1939 area of the USSR and only allow a detailed breakdown between European USSR and the non-European parts of the USSR. These figures give a good presentation

1. The disbandment of the army after the Bolshevik Revolution is assumed to have resulted in many (35%) of the soldiers gravitating to the towns. The refugees also tended to concentrate in the towns (over 30% of the refugees were listed as being urban throughout this period, whereas the general proportion was only 15%).

of the actual 'on hand' rural population and are presented in the table below:

The actual population on hand according to the 1916 & 1917 censuses

	Normal civilian popln.			1916 Army	1916 Refu-	1916 Army& Refu-	1917 Army& Refu-	All Population		
	1916	1917	change in %		gees	gees	gees	1916	1917	change in %
All										
. European USSR	92.50	89.88	-2.8	3.14	5.21	8.35	11.61	100.85	101.51	+0.7%
SCR										
Transcaucasus	6.06	5.51	-9.1	0.17	0.24	0.41	0.58	6.47	6.09	-6.0%
Turkestan	6.85	6.02	-12.2	0.25	0.04	0.29	0.40	7.14	6.42	-8.1%
SPR										
N.Caucasus	9.55	8.91	-6.7	0.78	0.17	0.95	1.33	10.50	10.24	-2.5%
EPR										
Sib.Krai	7.84	7.65	-2.3	0.58	0.10	0.68	0.95	8.52	8.60	+1.0%
Dal.Vost Krai	2.09	2.08	-0.1	0.12	0.01	0.13	0.19	2.22	2.27	+2.3%
Steppe Krai	4.14	3.97	-4.2	0.13	0.07	0.20	0.27	4.34	4.24	-2.4%
All USSR	129.03	124.03	-3.9	5.17	5.85	11.02	15.33	140.05	139.36	-0.5%
Urban										
European USSR	14.72	14.73	+0.03			1.40	1.94	16.12	16.67	+3.4%
SCR										
Transcaucasus	1.44	1.04	-28.3			0.11	0.14	1.55	1.18	-23.7%
Turkestan	1.10	0.95	-13.3			0.09	0.13	1.19	1.08	-13.3%
SPR										
N.Caucasus	1.30	0.96	-26.5			0.22	0.31	1.52	1.27	-16.6%
EPR										
Sib.Krai	0.71	0.76	+7.3			0.08	0.11	0.79	0.87	+10.1
Dal.Vost Krai	0.37	0.51	+37.5			0.05	0.07	0.42	0.58	+37.8
Steppe Krai	0.42	0.40	-5.0			0.05	0.06	0.47	0.46	-2.2
All USSR	20.07	19.34	-3.6			1.98	2.76	22.05	22.10	+0.2
Rural										
European USSR	77.78	75.16	-3.4			6.96	9.68	84.74	84.84	+0.1
SCR										
Transcaucasus	4.61	4.47	-4.1			0.32	0.44	4.93	4.91	-0.4
Turkestan	5.76	5.07	-12.0			0.19	0.27	5.95	5.34	-7.4
SPR										
N.Caucasus	8.25	7.96	-3.6			0.73	1.01	8.98	8.97	-0.1
EPR										
Sib.Krai	7.13	6.89	-3.3			0.60	0.85	7.73	7.74	+0.1
Dal.Vost Krai	1.71	1.57	-8.3			0.08	0.11	1.79	1.68	-6.1
Steppe Krai	3.72	3.57	-4.1			0.15	0.21	3.87	3.78	-2.4
All USSR	108.97	104.63	-3.9			9.03	12.63	118.00	117.26	-0.5

Source: E.Z.Volkov, ibid., pp.170, 180-1.

Population data according to type of producer

There are two major sources of data on the different types of producers: the demographic census data and landownership statistics. I will consider first the demographic data. These include the early revizii for the pre-reform period, the 1897 census and the 1916 agricultural and demographic census. Before emancipation of the peasantry in 1861 the grain producers could be classified as: the landowners (pomeshchiki), the peasant serfs and the free peasants (the state peasants). According to the 1858 reviziya there were at this time some 52 million peasants in the country of whom about 40% consisted of state peasants[1]. In Nifontov's book he presents the regional size of the population for these three types of grain producer for 32 gubernia of European Russia. These population figures are given in the table below:

The rural population in millions according to its distribution between the households of different types of producers in the 1850s.

	Population in Pomeshchik households	Population in Serf households	Population in state peasant households	All Population
NCR(15)	0.62	7.34	3.70	11.65
SPR(6)	0.33	4.60	2.87	7.81
CPR(9)	0.56	4.89	5.17	10.62
EPR(2)	0.02	0.48	2.57	3.07
ALL(32)	1.53	17.31	14.31	33.15
In %%				
NCR(15)	5.3%	63.0%	31.7%	100%
SPR(6)	4.3%	58.9%	36.8%	100%
CPR(9)	5.3%	46.0%	48.7%	100%
EPR(2)	0.6%	15.8%	83.6%	100%
ALL(32)	4.6%	52.2%	43.2%	100%

Source: A.S.Nifontov, ibid., p.129.

Note: The number of gubernii included within each region is indicated in brackets.

1. See P.I.Lyashchenko, Istoriya narodnogo khozyaistva SSSR Tom.1, M.1956,p.586.

From this table the following points can be seen:

First, the population in the Pomeshchik households accounted for just under 5% of all the population. This must have included labourers and servants as well as just the families of the Pomeshchiki. It accounted for between 4.3 and 5.3% in the NCR, SPR and CPR, but in the EPR it represented a much lower proportion, below 1%. The picture in the other gubernia distant from the traditional centres of Russian agriculture would tend to reflect the position in the EPR.

Secondly, the share of the population in the serf households was greater than those in the state peasant households in the NCR and SPR, and was just lower than it in the CPR. The position in the EPR was very different with the overwhelming majority of the population located in the households of the state peasants.

The emancipation of the peasantry in 1861 resulted in the removal of the formal distinction between the serfs and the state peasants.

By the time of the general demographic census of 1897 there were reported to be over 100 million peasants in the country in the rural areas, 0.8 million landowners and their families and 7.2 million of the group called raznochintsy (neither pomeshchik or peasant).

1897 census results for area of Russian Empire excluding Poland and Finland. Population in millions.

	All	urban	rural
Peasants	108.0	7.3	100.7
Raznochintsyi	15.6	8.4	7.2
Pomeshchiki	1.8	1.0	0.8
Foreigners	0.5		
ALL	125.6	16.8	108.7

Source: Obshcha Svod po Imperii rezultatov razrabotki dannyikh pervoi Vseobshchei perepisi naseleniya, SPb1905, vol I, p 160

The rural population was located in 19.13 million households with an average of 5.69 people per household[1].

1. Obshchii Svod ...

The pomeshchik population as given in these figures clearly only refers to the pomeshchik's immediate families. The 1886 decree on hiring agricultural labour had specifically states as one of the obligations of the employer, that he should feed the labourer with normal peasant food[1]. So there can be no doubt that the agricultural labourers should be included as part of the pomeshchik's household when it comes to calculating the grain forage balance by type of producer.

These figures are consequently non-comparable with the earlier figures and could only be made comparable if some means were available of calculating the numbers of the peasant population that were regularly working for the pomeshchiki.

The 1916 agricultural census, was much more useful on that score. One part of the questions of this census was specifically concerned with assessing the labour used on the pomeshchik estates. Unfortunately, the results from this part of the census were never published. But the Soviet historian A.M.Anfimov has discovered in the TsSU archives a preliminary draft of the results and has published parts of them[2].

Before looking at these, more detailed, data I will just give a brief summary of the main results of the 1916 census as available from other sources.

Kondratiev noted that the 1916 census gave the following results for the numbers of different types of rural household:

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1. PSZ, III, Tom VI, 1886, No.3803, article 32, cited from A.M.Anfimov, Krupnoye pomeshchichye khozyaistvo Evropyeiskoi Rossii, M.1969, p.49

2. See A.M.Anfimov, Rossiiskaya derevnya v gody pervoi mirovoi voiny, M.1962, pp.21-2, 98-100, 138, 151, 161, and A.M.Anfimov, Krupnoye pomeshchichye khozyaistvo Evreopyeiskoi Rossii, M.1969, (in many places throughout this book), and in A.M.Anfimov, in Problemy istochnikovedeniya, Tom VIII, M.1959, pp.31-49. These materials entitled simply Svod po Rossii are located in the TsSU archives reference (Arkhiv TsSU,otdel S.Kh.op.1, 1916g.,d.62, l.2-3).

	47 gubernii of European Russia	All Russia less Turkestan
Peasant households	15.492	18.671
Pomeshchik households	0.110	0.120
All households	15.602	18.791

Source: N.D.Kondratiev, Rynok khlebov..,M.1922, p.16.

Vainshtein informs us that the census indicated that the average size of peasant household was 5.84 and that the average size of pomeshchik household was 21.03[1]. Vainshtein consequently calculated the 1916 agricultural population to be the following:

	Number of households in millions	Average size of households	Population
Peasants	18.671	5.84	109.1
Pomeshchik households	0.120	21.03	2.5
Other			1.5
ALL			113.1

Source: see A.L.Vainshtein, ibid., p.454.

Note: the figures which Vainshtein ascribes to the pre-1939 area of the USSR are the same as those that Kondratiev ascribed to Russia less Turkestan.
Vainshtein does not explain what his 'other' category includes.

A regional breakdown for peasant households and population only are given in a 1930 source edited by Gayster[2]. This will be referred to later as it gives a good comparison with the later peasant population data (for 1923-27). But since its regionalisation is different from all the

1. See A.L.Vainshtein, Narodnoye bogatstvo i narodnokhozyaistvennoye nakopleniye predrevolyutsionnoi Rossii, M.1960, p.454.
The figure for peasant household size is identical to the one given in A.Gayster (ed.) Osnovniye elementy Sel.Khoz. proizvodstva SSSR 1916 i 1923-7gg. M.1930, pp.2-3. But the figure for pomeshchik households appears somewhat low according to Anfimov's data (see below)

2. See A.Gayster (ed.) Osnovniye elementy Sel.Khoz.proizvodstva SSSR 1916 i 1923-27gg.,M.1930, pp.2-5

other series so far mentioned, the figures that it gives by themselves would indicate little.

Returning now to the more detailed figures for the pomeshchik households supplied by Anfimov, we should note that they do not provide a full coverage of pomeshchik households, but they do cover a very large proportion of them. The data cover 84,143 households, which were 70.8% of all the pomeshchik households registered in the 1916 census, and these households contained 89.2 of all the pomeshchik sown land registered.[1] The missing households must therefore have had slightly less than the average sown area and so would no doubt have employed slightly less labourers. But apart from this, we can consider this source as providing a good presentation of the pomeshchik households, their activities and the number of people they employed.

Unfortunately, no regional breakdown was supplied by Anfimov, and in order to get a rough regional breakdown of the regional location of the different types of household we will have to consult the landownership statistics. Apart from this there is some uncertainty as to just what the figures on employment refer to. Anfimov states that they certainly excluded day labourers and that they also ought to have excluded people who were working for the pomeshchiki for only a month in the year. However, Anfimov did admit that these figures might include the latter, as well as the more long term labourers and employees[2]. The more long term labourers were classified as srokoviye (working for 5-6 months) or annual.

In order to get some form of impression of the relative magnitudes

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1. See A.M.Anfimov, ibid., M.1962, p.22
2. See A.M.Anfimov, ibid., M.1962, pp.99-100

of the different types of labourers Anfimov cited the following data from Tula Gubernia in 1917:

The relative importance of different types of labourers working on pomeshchik estates in Tula Gubernia in 1917.

Type of labourer	Number of worker days worked	relative share of all worker days worked
Annual	20,400	27.3%
Srokoviye	44,250	59.2%
Monthly	1,225	1.6%
Daily	8,926	11.9%
All	74,801	100%

Source: A.M.Anfimov, ibid., M.1962, p.108, citing archival copies of the results of part of the 1917 census.

These figures clearly indicate the major importance of annual and srokoviye labour and the relative unimportance of daily and monthly labour. However, it remains debatable just how representative these figures are for the whole USSR and whether they would have been applicable to the pre-war period.

Let us turn now to the detailed data published by Anfimov. The following table presents an indication of the number of hired labourers and employees employed by pomeshchik households according to the size of the pomeshchik estate measured in terms of their sown area: (see over page)

This table indicates several important points:

First, we see the very large amount of labour that was hired; over 1.4 million (including employees), an average of 17 per pomeshchik household. Secondly we see the very skewed distribution of these workers and employees between the different sized pomeshchik households. Twenty percent of the households, sowing over 100 desyatiny of land per household employed over 68% of these labourers and employees. Although the average numbers of workers employed was 17 per household, the average for 63% of the sowing

Type of household according to area sown	Number of households in ths.	in %	Hired labour-ers in thsds	Employ-ees in thsds.	All employ-ees & labour-ers in thsds.	in %	Workers & employ-ees per household	Workers per 100 des. sown
No sowings	7.97	9.5	35.8	23.4	59.1	4.1	7	-
0-10 des.	16.46	19.6	38.4	22.4	60.8	4.2	4	92
10-50 des.	28.28	33.6	125.6	47.4	172.8	12.0	6	24
50-100 des	14.07	16.7	127.0	33.3	160.3	11.1	11	18
100-250des	10.29	12.2	236.3	77.0	308.3	21.4	30	21
250-500des	4.41	5.2	195.3	68.4	263.6	18.3	60	17
500-1000 des.	2.02	2.4	168.6	41.4	210.0	14.5	104	16
1000-5000 des.	0.68	0.8	151.1	46.0	197.1	13.7	289	19
5000+ des.	0.01	0	11.0	0.2	11.3	0.8	1023	16
All	84.18	100	1088.8	354.5	1443.4	100	17	20

Source: A.M.Anfimov, Krupnoye pomeshchichye khozyaistvo Evropveiskoi Rossii, M.1969, p.51.

groups fell to below 10 while the top 3-4% employed over 100.

Thirdly, we see that the distribution of employment was with the exception of the groups with a relatively small sown area (under 50 desyatiny) very closely related to the area sown. Overall the average was to employ 20 workers per 100 desyatiny sown. The proportion was much higher for the households with a sown area under 50 desyatiny, but for all the other groups the average density of labour employed was fairly stable between 16 and 21 per 100 desyatiny. By comparison we should note that 119 million peasants sowed an area of 90 million hectares (82 million desyatiny). If we reduce the number of peasants by 40% to account for those not engaged in agricultural pursuits on their own land and the non-active peasant population (i.e. the young and very old)[1] we would receive an average figure of 87

1. This is quite a generous reduction, if I had reduced the number of peasants working their own land by a smaller amount the proportion would of course have been much higher.

peasants working per 100 desyatiny of sown land. This is fairly close to the numbers employed in the 20% of pomeshchik households sowing less than 10 desyatiny. But it is over four times as large as the average for all the pomeshchik households. This would appear to be the major reason for the higher surpluses generated by these households.

As mentioned above these figures do appear to differ a little from the figures for the average size of pomeshchik households by Vainshtein. Vainshtein had suggested that the average pomeshchik household contained 21.03 people. The figures cited here give over 17 for just workers and employees. This would allow less than 4 people for the numbers in pomeshchik families and the numbers of private servants[1]. Since the pomeshchik family was likely to be no smaller than the peasant family with 5.8 persons per family, and since there were on average about 2 servants per household[2] we should have expected an average size of pomeshchik household of about 24 and not the 23 cited by Vainshtein. Vainshtein's figures may however be including a larger proportion of smaller pomeshchik households that were not included in Anfimov's data.

Another problem with these data is trying to assess how typical the situation indicated for 1916 was of the pre-war period. In another book Anfimov informs us that over 27% of the workers and employees listed in his 1916 data, were not normal peasants but were prisoners of war and refugees, who had been pressed into service because of the manpower shortages. The distribution of prisoner of war and refugee labour is indicated in the following table:

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1. Anfimov is quite clear that the above mentioned figures exclude private servants.
2. According to the 1897 census. Obsh. Svod. SP.

Type of household according to area sown	Number of households in thousands	No. of hired labourers and employees in thousands	of whom prisoners of war	refugees	as % of all labourers & employees prisoners of war	refugees
No sowings	7.97	59.1	6.2	3.5	17.3	5.9
0-10 des.	16.46	60.8	4.7	4.3	12.3	7.1
10-50 des.	28.28	173.9	23.7	15.1	18.7	8.7
50-100 des.	14.07	167.4	29.0	14.9	17.4	8.9
100-250 des.	10.79	313.4	55.8	26.0	17.8	8.3
250-500 des.	4.41	263.7	60.2	15.4	30.8	5.9
500-1000 des.	2.02	210.0	55.9	11.6	33.2	5.5
1000-5000 des.	0.68	177.1	55.1	7.6	36.5	3.9
5000+ des.	0.01	11.3	3.0	0.3	27.4	2.9
All	84.18	1456.7	293.6	98.7	20.2	6.8

Source: A.M.Anfimov, Rossiiskaya derevnya v godyi pervoi mirovoi voiny , M.1962, p.98.

Note: no explanation is given for the slight discrepancy between these figures and those given above. The difference is in any case very small

Clearly this must cast some doubt on how representative of the pre-war period these figures would be. I would suggest that the best approach to these figures is to assume that the indications of the numbers of workers employed per 100 desyatiny of sown area is probably fairly representative of pre-war levels, and that the effect of the labour shortage was mainly to reduce the area sown rather than to change the methods of organising labour. The total number of labourers employed by the pomeshchiki before the war would consequently have been larger in direct proportion to the extent that pomeshchik sowings had been larger before the war. This question will be further discussed below when I consider the available data on the size of pomeshchik grain production.

A rough indication of the regional location of landowner and peasant households is available from the landownership census of 1905. The results of this census have been conveniently tabulated by Kondratiev and Oganovsky and it is their work which is cited below. The regional distribution of the different types of households involved in land ownership are listed below for the 42 gubernii of European Russia:

	Peasant households farming on allotment land	Households on privately owned land		
		all	peasant	non-peasant
NCP	2.97	0.35	0.27	0.08
SPR	3.12	0.24	0.15	0.09
CPR	4.11	0.16	0.12	0.04
All 42 gubernii of European Russia	11.20	0.76	0.54	0.22

Source: See N.D.Kondratiev (ed.) Selskoe khozyaistvo Rossii v XX veke, M.1923, pp.66-73.

Not all of the non-peasant private landowner households would be pomeshchik farmers. According to another table of landownership statistics given by Kondratiev[1], in 1905 the pomeshchiki owned 68% of the non-peasant privately owned land, and in 1911 this proportion had dropped to 64%. Assuming that these figures were roughly correlated with the numbers of households, then the number of pomeshchik households would have been about 150 thousand in 1905 for the 42 gubernia of European Russia. If we assume a gentle fall in numbers from 1905 to 1914 and then a sharp fall during the war, then these figures are quite comparable with the 1916 census result of 110 thousand landowner households in the 47 gubernia of European Russia.

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1. See N.D.Kondratiev, ibid., M.1923, pp.64-5.

b) Data on grain used as food

ii) Grain consumption norms

For the very early work on estimating possible grain surpluses, surplus to the needs of the agricultural sector, the consumption norm usually accepted was not based on any statistical material, but on the level of soldiers' rations that had been accepted by the army from the middle of the eighteenth century.

In 1840 Academician Keppen gave the following justi ication of a norm of 0.356 tons per person for the consumption of grain:-

> In agreement with Reguly dlya provianskogo pravleniya published on 9 January 1758 each soldier receives monthly 72½ lbs of flour or 52½ of crisp bread (Reguly dlya proviantskogo pravleniya chapter vii p.1). At first he received 1 garnet (5 lbs) of groats per month but after the manifesto of the 17 March 1775 he was given 1½ garnets a month. Consequently every year each soldier received 21 pds 30 lbs of flour and 2 chetverts 2 garntsii (i.e. 2 pds 10 lbs) of groats ... But I am not counting here the consumption of groats ... and I am not including the quantity of grain required for feeding cattle, therefore the calculation here can only be approximate. Therefore taking round figures it is possible to calculate about 3 chetverts for each person[1].

However this was normally considered to be a maximum norm, possibly covering elements other than personal consumption. In 1842 D.Protopopov in the journal of the Ministry of State Property also quoted these army

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1. Keppen, 'O potreblenie khleba v Rossii', Zhurnal MVD , No.6, Vol.36, 1840, p.405.

rations but added:

> People acquainted with this business believe that this quantity (3 chetverts per person SGW) is more than sufficient for the most copious feeding of soldiers.

He noted that with the increase in consumption of other foodstuffs the consumption of grain must fall. Later he continued:

> There is no doubt whatsoever; a grain portion of 3 chetverts cannot be considered as an average for all and for each. It must be lowered significantly to a level of 2 chetverts or, if taken as a whole for the whole mass of the population of both sexes and all ages, it will have to indicate the quantity of grain consumed not only for the satisfaction of the needs of the population but also for feeding livestock. This is particularly important due to the fact that the separate calculation of the consumption of grain feed for cattle is impossible due to the scarcity of data[1].

Protopopov therefore implied a deflator of 1/3 as being necessary to adjust for this difference in age and sex structure between adult males (soldiers) and the total population.

Converting these figures into metric units we see the following values:

	per soldier	per head
Keppen 1758 army ration	0.356 tons flour 0.025 tons groats 0.381	
1775 army ration	0.356 tons flour 0.037 tons groats 0.391	
Protopopov		0.237 tons flour 0.025 tons groats 0.262

1. O.Protopopov 'O khlebnoi torgovli v Rossii' Zhurnal MGI , 1842, vol.3,pp.93, 95-6

It should be noted that these norms are given in their flour equivalent and not in grain equivalents. The grain equivalent of these figures would be 15-20% higher depending on the extraction rate.

Rural consumption norms

In the 1860s in the construction of his early grain forage balance, the Department of Agriculture specialist I.Vilson accepted the following average per capita personal consumption norms:

	In chetvert per capita per year			In tons per capita per year		
	Winter grains	Spring grains	All	Winter grains	Spring grains	All
For adults	2.5	0.2	2.7	0.315	0.025	0.340
For young and old	1.25	0.1	1.35	0.158	0.013	0.170
For all	2.0	0.2	2.2	0.252	0.025	0.277

Source: See I.Vilson (compiler) Obyasneniya k khozyaistvenno-statisticheskomu atlasu Evropyeiskoi Rossii, izd.4, SPb.1869, pp.106-107

These norms were based on the results of a survey carried out by Ya.A.Solovyev in Smolensk gubernia. Vilson notes that the level of grain consumption undoubtedly differed from region to region and that accounts of the level of consumption were often exaggerated, but he recommended the acceptance of these Solovyev norms as being more reliable than any other study[1]. He also pointed out that these figures were fairly close to those recommended by Keppen and Tengoborsky[2]. In fact, as we can see by comparison with the figures given above they represented a lower figure for adult consumption but a slightly higher figure for the average consumption of all the population.

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1. I have not been able to trace Solovyev's original work.
2. I.Vilson, (compiler), ibid., p.107.

By the 1890s the official norms accepted for the peasant population were all much lower. These norms were received not from budget data but apparently by means of dividing uncorrected production data (net of seed) for the food grains by the population figures. They consequently represent figures in grain equivalents and not flour equivalents like the ration based norm described above. In the 1890s there was a difference of opinion between the TsSK on the one hand and the zemstvo and academic statisticians on the other hand. In conditions of the agricultural depression of the early 1890s it was natural that the analysis of the consumption of grain and the determination of the size of grain surpluses should become a matter of great interest and controversy.

The radical intelligentsia including several prominent statisticians accused the central statisticians of TsSK and MVD of under-estimating peasant grain consumption, so as to show that agriculture was in a relatively healthy state and that there were great surpluses available for export.

The view of the central statisticians was expressed by the published work of the special commission of the Ministry of the Interior set up specifically to review the conditions of food consumption. The commission worked under the chairmanship of privy counsellor V.K.Von Pleve and its work was published in 1894 entitled 'The average grain and potato harvests for ten years 1883-92 in 60 gubernii of European Russia in relationship to national consumpton'[1].

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1. Vremennik TsSK, 1894, no.34.

In this account no correction was made to gross production and the consumption norm used was 0.213 tons of all grains (including potatoes converted to their rye equivalent) in grain equivalent for personal consumption for all the population. The authors of this work V.D.Alenitsyn and Yu.V.Brunneman, explained that this was the norm accepted by TsSK at the time (referring to the 'main results of the grain harvest in European Russia in 1892'[1]) and that it was slightly higher than the earlier figure accepted by TsSK in 1884, when the figure accepted was only 0.147 tons (1 chetvert of winter grains and half a chetvert of spring grains) per head. Consequently they claimed that, 'the accepted norm has been set at a level somewhat higher than reality so as to present a less dangerous figure, so as to eliminate the possibility of presenting the case in a better light than it is in reality, which in connection with mass consumption could have undesirable consequences'[2].

The exact source of this norm is not stated, but it appears to have been arrived at by estimation or by dividing production of food grains, less seed, by the size of the population.

At virtually the same time D.P.Semyenov[3] calculated the average personal consumption norm for the population for the period 1883-93, which spans the famine, to be 0.218 tons per head per year in grain equivalents[4]. This figure was based on the residual left when seed and exports were deducted from the uncorrected gross production data for the

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1. Vremennik TsSK, 1892, no.25.
2. Vremennik TsSK, 1894, no.34, pp.2-3
3. I am not sure whether or not this is a misprint for P.P.Semyonov who was director of TsSK at the time. It would appear to be likely.
4. See Selskoye i Lesnoye Khozyaistvo Rossii, SPb.1893, p.138, This book had been specially produced for an international exhibition in Chicago.

food grains and when the whole sum was divided by the population figure. Feed grains alone would indicate a norm of 0.069 tons per head of population per year which could all be assigned to livestock feed. Potatoes in their rye equivalent would give an additional norm for personal consumption of 0.010 tons per person per year. Semyonov states that these figures were close to the figures calculated by the statistical department of the Ministry of Communications when they had taken into account transport data.

This whole question was made even more complex when several prominent statisticians headed by Fortunatov maintained that serious upward corrections were needed to TsSK production data and that consequently the residually calculated consumption norms should be higher than those calculated by TsSK. It was at this point that the zemstvo statisticians held their first Statistical Congress, and took the first steps towards calling for a comprehensive system of consumption studies. I have described all this above[1].

As already mentioned L.N.Maress provided one of the earliest attempts to aggregate the results of some of the few consumption studies which had been carried out by the mid 1890s. His study covered investigations which had been carried out in 12 provinces, and on the basis of these results he calculated an average consumption norm of 19.21 pds of grain per head per year i.e. 0.315 tons per head per year in grain equivalent. This average was composed of a norm of 0.276 tons of rye and wheat and 0.040 tons of other grains. Apart from the pure grains Maress noted that an average of 0.129 tons per head per year of potatoes were consumed. Assuming that potatoes had a grain equivalent of 5:1, this would be

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1. see pp32-5

equivalent to another 0.026 tons per head per year in grain equivalents i.e. 0.341 tons per head per year for grain and potatoes combined.

However little faith should be placed in the exact significance of this average figure, because the sample of cases studied in each of these twelve investigations was very small. Two investigations were based on only one household's budget, five were based on only two budgets and only six of the investigations were based on more than ten budgets. These investigated households were, no doubt believed by the investigators to be more or less typical of all peasant households in the given area, but nevertheless the statistical significance of such a small sample must remain somewhat dubious.

In their introduction to the book in which Maress's study was contained, Chuprov and Posnikov stated that they believed a lower figure of 18 pds per head i.e. 0.295 tons per head to be the correct norm for the consumption of grain and potatoes converted into their rye grain equivalent[1]. Although they did admit rather confusingly that a further pud (i.e. 0.016 tons per head per year) should be added for losses in milling. This would give them a total average norm of 0.311 tons per head per year. This was much higher than the Protopopov norm.

Chuprov and Posnikov also went on to give an explanation for the difference between the low TsSK norm of 0.213 tons per head per year and their own figure of 0.295-0.311 tons per head per year:

> Such a difference is fully explained by the difference in aims of the calculations of the consumption norms. The 18 pd (0.295 tons) norm represents average actual consumption as it is in years of average yield in normal

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1. A.I.Chuprov and A.S.Posnikov, (eds.) ibid., SPb.1897, p.2.

> conditions; the norm of the Central Committee - 13 pds (0.213 tons) per head represents the minimum consumption, which could support the whole population in years of harvest failure. It is according to this norm that the government assistance is distributed in years of harvest failure and which as is shown by the following peasant budgets, is forced to satisfy the poorest peasant families.[1]

As explained above, the TsSK statisticians did not entirely share this opinion, and this interpretation of their own figures. They had claimed that they were giving generous norms.

Later in the article which N.A.Svavitsky wrote for the Efron and Brokhaus Encyclopaedia[2], the results of several much larger scale investigations were aggregated. These covered nine separate provinces and provided a much lower average norm than did Maress's data. The Svavitsky average norm was 17.3 pds per head per year of grain, i.e. 0.283 tons per head per year. This appears much lower than the Maress norm and even somewhat lower than the Chuprov/Posnikov figure.

Later in 1915, Chayanov organised his major study of peasant food consumption norms. The Chayanov compilation was based on the nine regional studies made by Svavitsky plus another nine. These 18 separate studies covered well over 7,140 separate budgets, with an average of 476 budgets per study[3]. Most of these investigations covered the period after 1898, although Shcherbin's classic study of Voronezh peasant budgets 1885-1897 was also included. Most of the more recent studies; by Popov

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1. From footnote to introduction p.11 'Vliyaniye urozhaev i khlebnikh tsen na nekotoriye storonyi russkogo narodnogo khozyaistva', SPb.1897.
2. Krestyanskiye Budzhety, in Entsikloped.Slovar Brokgauz i Efron,
3. See A.V.Chayanov (ed.) ibid., SPb. 1915, p.11.

in Tula G., 1910-12, by Groman in Penza G., 1912/13, by Vikhlyaev in Moscow G., 1912 and by Chayanov himself in Moscow G., 1910, had not yet been published and were sent to Chayanov in manuscript form. The different studies used different methods of investigation; Income and Expenditure accounts books had been used in Moscow (Chayanov) and in Poltava, most had used expeditionary methods, but some had used questionnaires[1].

The results of all these investigations as regards grain consumption as given in 17 separate provinces are listed below:

	Consumption of grain per hd.			Consumption of grain				Consumption of	
	avg.in tons	min %	max %	% Rye	% Wheat	%	% Others	potat-toes	grain & potat-toes
Vyatskaya	0.292	66.3	164.4	72.7	10.29	2.47	24.6	0.009	0.301
Vologodskaya	0.235	81.5	157.4	59.2	9.52	2.49	28.76	0.015	0.249
Olenetskaya	0.361			92.1		7.9		0.016	0.376
Novgorodskaya	0.264	55.3	157.7	70.8	3.1		26.1	0.024	0.286
Kostromskaya	0.218	74.6	125.7	74.5	10.1	4.6	11.0	0.013	0.231
Yaroslavskaya	0.226	77.1	104.5	86.3			13.7	0.024	0.250
Moskovskaya*	0.227			41.6	18.7	9.4	30.3	0.043	0.271
Smolenskaya	0.228			85.2	2.7		12.1	0.052	0.280
Kaluzhskaya*	0.277			83.3	3.4	11.7	1.63	0.042	0.319
Tulskaya	0.209	76.3	115.0	87.3		6.9	5.9	0.052	0.261
Penzenskaya	0.232			74.9	4.5	17.9	2.6	0.032	0.264
Simbirskaya	0.319			64.6	10.5	13.3	11.7	0.031	0.350
Voronezhskaya	0.295	83.2	112.8	67.6	15.5	7.3	9.6	0.024	0.320
Kharkovskaya	0.275	60.3	118.2	19.6	74.6	4.7	1.1	0.016	0.290
Poltavskaya	0.237	62.9	134.4	49.6	33.3	6.0	14.1	0.032	0.269
Khersonskaya	(0.450)	68.5	135.0	36.1	54.5	8.7	-	0.030	0.480
Astrakhanskaya	(0.195)							0.008	0.203
Kazachnoe Voisko									
Average	0.266	82.0	124.0					0.027	0.293
Average (for all cases less Olenetskaya & Kherson. G.)	0.262/0.245								

1. For further details see A.V.Chayanov (ed.), ibid., SPb.1915,p.10.

from A.V.Chayanov Materialy..., vyp.1 M.1916, pp.36, 39, 47.

* Figures only given for reliable uezd in gubernia, other figures for other uezds given, but no gubernial average given.

The average is given as the simple arithmetic average, with no attempt to weight the regions for the importance of the different regions. In the text an average consumption norm of 0.262 tons per head per year was given, which it was claimed was the average norm, after the extremely high (and somewhat unbelievable) figures for Olonetskaya G. and Khersonskaya G. had been subtracted. But in fact the average norm excluding these two regions would have been 0.245 tons per head per year.

N.I.Sazykhin was delegated to look after grain consumption and to write the section of the report pertaining to the consumption of grain. He appears to have made an important and rather fundamental mistake. In comparing the results of this study with those of Maress and Svavitsky, Sazykhin was struck by the apparent drop in average annual per capita consumption of as much as 3 pds i.e. 0.049 tons. And was misled into concluding that 'a drop of 3 pds per head is more than could be explained by sampling errors and is more likely to reflect a change in grain consumption'[1]. But as one of Sazykhin's colleagues later pointed out the reason for this difference was not a substantial change in consumption patterns, but just a different concept[2]. The earlier Maress and Svavitsky norms had been calculated in grain equivalents, while the more recent norms were apparently based on flour equivalents. If a correction for an 82% extraction rate (in milling) is made then the Maress norm would fall to a flour equivalent of 0.257 tons per head per year and the Svavitsky norm would fall to 0.231 tons per head per year. Maress's norm

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1. A.V.Chayanov, (ed.) ibid., M.1916, p.33.
2. S.A.Klepikov, ibid., M.1920, p.26. Earlier Klepikov had been in charge of the analyses of the consumption of milk, eggs, tea and sugar, in the 1916 study.

is therefore totally comparable with the Chayanov norm of 0.262 tons. And although the Svavitsky norm is much lower this must be explained by the regional coverage as all of Svavitsky's cases are included in the Chayanov compilation.

Sazykhin was more successful in drawing attention to the great fluctuations in norms for different regions (See table). If the extreme cases, Khersan uezd in Kherson G. with a norm of 0.450 tons (171.7% of average)and Volokolmskii uezd in Moscow G. with a norm of 0.180 tons (68.8% of average), were excluded from the count the norm would be even lower at 0.256 tons per head and the new extreme cases would both be within 25% of the average (i.e. Simbirsk G. at 0.319 tons, 124% of average and Tula at 0.209 tons, 82% of average).

From the table it can be seen that the provinces in the NCR (Kostroma, Yaroslavl, Moscow, Smolensk, Kaluzha,Tula) have an average norm of 0.224 tons per head; whereas the norm for the producer regions (excluding Astrakhan) was much higher at 0.296 per head.

Apart from deviations between areas there were also considerable deviations within the same region and between different households in the same region. Sazykhin drew attention to this and demonstrated it with examples from uezds in Kharkov and Vologda Gubernit, where the consumption of the population in different households was given according to divisions into groups according to size of sown area.

Starobelsky uezd Kharkov Gubernia Group in Sown Area	Consumption	Velsky uezd Vologodskaya Gubernia Group acc.to S.A.	Consumption
0 des	0.223 tons/head	0-2 des	0.200 tons/head
0.1-3.0 des	0.228 tons/head	2.1-3 des	0.213 tons/head
3.1-7.5 des	0.293 tons/head	3.1-4 des	0.211 tons/head
7.6-15.0 des	0.288 tons/head	4.1-6 des	0.246 tons/head
15.1+ des	0.331 tons/head	6.1+ des	0.282 tons/head
Average	0.275 tons/head	Average	0.224 tons/head

Source: A.V.Chayanov 'Materialy...,'Vyp 1 M.1916, p.34.

As can be seen from the above table the norm of consumption increases with the increase in sown area of the household. We see no signs of a negative grain consumption elasticity to sown area.

Apart from a change in the volume of grain consumption norm with change in sowing group, there was also evident a change in the internal content of the norm, i.e. a substitution effect between different grains and grain products within the norm as is shown below:

Starobelsky uezd, Kharkov Gubernia Consumption of grain products per head (edoki) in puds

Groups of households acc. to S.A.	Wheat flour	Rye flour	Black bread	Bulki rolls	Groats pasta	All grain products	wheat consumed per 1 pd of rye bread
0.0 des	9.61	4.33	4.47	0.01	0.64	19.06	1.9
0.1-3 des	13.15	5.68	0.10	0.04	0.5	19.47	2.27
3.1-7.5 des	19.00	5.07		0.05	0.93	25.05	3.75
7.6-15 des	18.44	4.67		0.03	1.5	24.64	3.95
15.1+ des	21.89	5.03		0.00	1.35	28.32	4.36
Average	18.75	4.95	0.25	0.04	1.19	25.18	3.79

Source: A.V.Chayanov 'Materialy...,' vyp.1, M.1916, p.43.

With a change in sowing group and move to a group with a larger sown area there was a shift to the consumption of wheat and groats.

Chayanov's work was undoubtedly a great advance on the earlier state of knowledge, but it was still based on a very small regional coverage, and could quite readily be drastically affected by the addition of cases from regions with a markedly different level of consumption. Even before Chayanov's book went to press, data from other regions were appearing.

R.M.Orzhenskii forwarded data from a large study in Yaroslavl G. in 1915 covering 1,023 households. These data indicated a low consumption norm of 12.32 pds 0.202 tons per head per year in 1915. A.N.Chelintsev also reported on a study of 85 households in Tambovskaya G. in 1915 which also indicated a consumption norm lower than the average, 14.25 pds i.e. 0.233 tons per head per year[1]. The inclusion of these two regions would have brought the Chayanov norm down lower[2].

A final revision of all the available data for pre-war peasant consumption appeared in 1920, written by S.A.Klepikov, but still under Chayanov's general editorship[3]. This study included a further 1,791 budget studies in 11 provinces more than in the earlier study[4], with the result that the average consumption norm was reduced slightly from the

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1. See A.V.Chayanov, (ed.) ibid., M.1916, pp.5, 86-87
2. If the average for all regions less Olonetskaya G. and Khersonskaya G. had really been 0.262 tons per head per year, the inclusion of these two regions would have brought the average down to 0.252 tons per head per year. This was the figure that Lositsky subsequently stated in his report. But it should also be noted that according to my calculations of the data given the average for all regions was initially 0.266. The average with the inclusion of Yaroslavl and Tambov G. was 0.262. The average for all regions less Olonetskaya, Khersonskaya, the new Yaroslavlskaya survey and Tambovskaya G. was 0.245.
3. S.A.Klepikov, ibid., M.1920
4. S.A.Klepikov, ibid., M.1920, p.7. These additions do not include the 1,023 budgets from Yaroslavl G. mentioned above.

earlier level.

A summary of Klepikov's norms are given below:

	Flour Norms per head	per adult	Grain Norms per head	per adult	Extraction rate	The ratio of consumption per head/ consumption per adult
All Russia	0.267	0.393	0.321	0.459	83.2	0.70
European Russia	0.255	0.379	0.305	0.455	83.6	0.67
Consumer regions	0.241		0.288		83.7	
Producer regions	0.278		0.334		83.2	

Source: S.A.Klepikov, ibid., M.1920, pp. 8,26.

These figures indicate a 15% difference between consumption norms in the producer and consumer regions, with the former being the higher. Other differences in the figures of up to 17 and 33% are a consequence of differences between concepts of the consumption norm, as to whether it is referring to grain or flour (a 17% difference) or whether it is referring to all the population or only to adults (30-33% difference). These differences in concept were not always fully understood, even it would appear amongst the experts.

Klepikov's data also allows us to break down the norms according to grain:

	All Russia per head	per adult	European Russia per head	per adult
Rye flour	0.131	0.196	0.159	0.239
Wheat flour	0.095	0.136	0.049	0.070
Other flour	0.020	0.030	0.025	0.037
Groats	0.018	0.027	0.019	0.029
Beans	0.003	0.004	0.003	0.004
All grains in flour	0.267	0.267	0.255	0.379
Potatoes	0.035	0.046	0.037	0.055
All grains & potatoes in flour equivalents	0.302	0.439	0.292	0.434

Source: S.A.Klepikov, ibid., M.1920, pp.27, 35.

Klepikov also presented an interesting break-down of consumption according to the income of the household. These differentiated norms are given below:

Grain Consumption in tons per adult per year

Income	Rye flour	Wheat flour	other flour	Groats	Beans	All	All in % of 0-100
0-100 rubles	0.195	0.013	0.053	0.008	0.002	0.270	100
100-150 "	0.214	0.019	0.070	0.013	0.005	0.372	119
150-200 "	0.251	0.018	0.086	0.014	0.006	0.375	139
200+ "	0.252	0.038	0.093	0.022	0.007	0.412	153

Source: ibid., M.1920, p.32.

Again we see no sign of a negative grain consumption elasticity to income. And the Wheat flour consumption elasticity is much greater than the Rye flour consumption elasticity.

A further table of Klepikov's does however enable us to compare the consumption elasticity of grain consumption in comparison with that for the other foodstuffs:

Income	grain cons.in tons	Rye flour in %	Meat & Fish cons.in %	Milk cons.in %	Sugar cons.in %
0-100 rubles	0.270	100	100	100	100
100-150 "	0.322	119	176	151	163
150-200 "	0.375	139	201	173	237
200-300 "	0.399	148	312	183	287
300+ "	0.457	164	560	237	375

Consumpton of main foodstuffs in tons per adult per year, and in %% of low incomes group consumption.

Source: ibid., M.1920, pp.30,31.

This indicates that although there is a positive grain consumption elasticity to income it is much smaller than the elasticity for all the other main foodstuffs.

Urban consumption norms

The coverage of urban food consumption budgets was much less developed than those for the peasantry. But a few studies had been made following the early work of F.F.Erisman on Moscow workers. V.S. Ovsyannikov gathered data from 3589 pre-war budgets from oil refinery workers in Baku. Other studies of workers were carried out by I.M. Shaposhnikov, V.I.Goritsky, and V.A. Andreyev of factory workers in Kostroma Gubernia and M.A.Davidovich of Petrograd textile workers[1].

In connection with the wartime work on food supply planning Y.Shub appears to have been placed in charge of analysing urban consumption. In 1918, under Shub's editorship Kabo produced a work surveying recent food consumption patterns in four towns; Moscow, Tula, Saratov and Orenburg where reliable data were available. Data had already been published on Moscow, Saratov and Orenburg, and Popov again obliged by forwarding to Kabo an unpublished manuscript on urban consumption in Tula.

The data from these four urban areas allowed urban consumption norms to be calculated which were differentiated by economic group:

	Consumption in flour equivalent per head per year		
	Rye flour	Wheat flour	Rye & Wheat
Low economic group	0.076	0.127	0.203
Average " "	0.051	0.128	0.179
High " "	0.054	0.133	0.187
Grand average	0.066	0.128	0.194

Source: R.Kabo, ibid., M.1918, p.41.

Kabo informs us that if the data from other available studies of urban areas were included the norms of consumption would rise to 0.072

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1. See A.E.Lositsky, introduction to Trudy TsSU, Tom XXX, vyp.2, p.15. Note: the famous budget studies of workers by S.N.Prokopovich in Petrograd, and G.Naumov in Kiev, could not be used because they did not provide data on food consumption in physical quantities

tons per head per year of rye flour, 0.125 tons per head of wheat flour, i.e. 0.197 tons together. And apart from these two grains a further 0.044 tons of groats, macaroni, and peas should be added to give an average urban consumption of 0.241 tons per head per year. Potatoes were also consumed at a rate of 0.120 tons per head per year, which had a grain equivalent of 0.024 tons per head per year.

	Urban flour norm per head	Urban grain norm per head
Rye flour	0.072	0.087
Wheat	0.125	0.150
Groats and other grains	0.044	0.053
All grain	0.241	0.290
Potatoes in grain ≡	0.020	0.024
All grain & potato in grain ≡	0.261	0.314

The reliability of the consumption norms data

Concerning the reliability of all these data, we must be extremely careful. The regional spread was very small and haphazard, and may well present results untypical for Russia as a whole. Within each region, the households surveyed may be untypical of the mass of households in their consumption patterns. Little attention has been paid in these surveys to correct for the different age structures present in the different households. And finally the data that these surveys supply may not be correctly or honestly reported.

A.N.Kokshaiskii, who directed the Saratov investigations pointed out that in his region the opinion was widely held amongst the peasants that agreement to participate in a food survey would automatically result in the receipt of rations. Consequently he believed that several households

exaggerated their real level of consumption in the hope of thereby receiving higher rations[1].

Kabo also pointed out the problems due to subjective factors. Because of the expense of carrying out full detailed investigations of the separate households, in most cases these food investigation data were collected simply by asking the householders to make a subjective evaluation of how much food they consumed. A more objective method of measurement had only been attempted in a few studies. In the Moscow survey of 1916 a strict daily account of food consumption was kept for a week, with investigators measuring food purchased, consumed and remaining unused every day. When the results of this more objective investigation were compared with the normal subjective investigations the results were seen to be significantly lower:

Consumption of grain in Moscow in 1916
in lbs per head per day

	Worker	Employee	Property Owner
Objective invest.	0.99	0.90	0.88
Subjective invest.	1.28	1.16	1.04
% Difference	30%	29%	18%

Source: See R.Kabo, ibid., M.1918, p.2.

Note: A similar experiment was apparently also carried out in Tula, under Popov's leadership, but the results from it were not available when Kabo completed her work.

This must cast considerable doubt on the overall absolute validity of most of the food consumption studies, which employed subjective methods.

When statisticians later came to compile their operational grain forage balances, they were, as we shall see below, most reluctant to accept these calculated consumption norms as they stood without substantial corrections. A.E.Lositsky in compiling the 1917/18 grain forage balance

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1. See R.Kabo, ibid., M.1918, p.3.

in the autumn of 1917 used per capita consumption norms of 0.218 tons of grain per head per year for the rural population and 0.145 tons per head per year for the urban population[1], instead of Klepikov's norm of 0.321 tons of grain per head per year or Kabo's norm of 0.241 tons of flour per head per year (roughly equivalent to 0.290 tons of grain per head per year).

In 1921, P.I.Popov used per capita grain consumption norms for pre-war grain consumption considerably higher than Lositsky's 1917 norms but still much lower than the Klepikov and Kabo norms, i.e. 0.295 tons per head per year of grain for the rural population instead of 0.321 and 0.246 instead of 0.290 for urban grain consumption.

But most strikingly of all we should note that S.A.Klepikov, himself when he later (1922) came to draw up a series of grain forage balances which included the pre-war period, also accepted a level of pre-war per capita consumption significantly lower than those which he presented in his survey of the food investigations data. In the balance which he constructed for grain utilisation in the European part of the RSFSR before the war Klepikov used a rural grain consumption norm of 0.211 tons per head per year and an urban norm of 0.189 tons per head per year[2]. Finally, it should be noted that whenever Klepikov's data were cited by the TsSU

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1. See below.

2. See S.A.Klepikov, 'Neurozhai 1921 goda (Tsifry i fakty)', Sel. i Les.Khoz.,1921, No.1/3 pp.195-211. (see later chapter pp. 610-11) It is difficult comparing the results from this study with the earlier one because the 1921 European part of the RSFSR excludes the area of the Ukraine, while the data for the pre-war European part of Russia included the Ukraine. Per capita grain consumption rates were undoubtedly higher in the Ukraine than in the rest of European Russia before the war, but not by a sufficient margin to explain the differences between Klepikov's data.

department of consumption statistics in the 1920s, they compared Klepikov's data in flour equivalents with their own later data in grain equivalents[1]. This effectively deflated the Klepikov data by 15-20%

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1. See Trudy TsSU, tom XXX, vyp.2, M.1928, p.67; Statisticheskii Spravochnik SSSR, M.1927, p.313; Statisticheskii Spravochnik SSSR, M.1929, p.402-5

Grain rations for the civilian population

Military rations have been dealt with above, here I am only concerned with civilian rations. There were two kinds of civilian ration a) the ration allowed to the producer and b) the ration given to the consumer. First the producer's ration.

The grain levy (razverstka) was first introduced by the Tsarist Minister of Agriculture in November 1916. The system was the following: the anticipated requirements of the army and other preferential groups for 1916/17 were calculated. The chairman of the Special Council on food supply was instructed to divide the required amount of grain to the different gubernia giving each one a quota to be fulfilled. The quota was to be determined on the basis of the harvest, the stocks and the consumption in each area. Within each gubernia the levy was to be apportioned successively among the several uezds, volosts, villages and individual households. The gubernia zemstvo offices together with the local commissioners of the special council and the Ministry of Agriculture were to divide the quota between the different uezds. At the uezd level the levy was apportioned by the uezd zemstvo offices and within the volost the quota was further apportioned by volost and village meetings[1]. At this time no centrally determined scale of consumption norms or rations were specified to assist the local authorities to ascertain what the normal consumption level was. It was assumed that the local authorities themselves would know better than the central authorities what the local consumption patterns were.

In the following year the Provisional Government took a tougher line and in the law of March 25, 1917 they specified the ration or norm that

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1. See K.I.Zaitsev and N.V.Dolinsky in P.B.Struve (ed.) Food supply in Russia during the world war, Yale 1930, pp.89-91

the grain producer was allowed to keep for himself and his family. This ration was set at one-and-a-quarter puds of grain per head per month and 10 zolotnik of groats per head per day[1]. This is equivalent to 15 puds or 0.246 tons of grain per head per year plus 0.016 tons of groats per head per year. This was about 18% lower than the Klepikov norm of 0.321 tons of grain per head per year, but over 12% higher than the norm that Lositsky used in the calculation of his grain forage balance. In comparison with later norms for producers this one was quite generous. It was not applied very strictly and the law of March 25 even allowed for an additional 10% of all the estimated needs of the grain producing households to be left to them 'to meet all eventualities'[2].

The position as regards rations for consumers was much less certain. Rationing was introduced in a piecemeal fashion in the major cities from the autumn of 1916, but at first it covered only sugar, salt and then meat. The system was formally regularised by an order from the Ministry of food supply in June 1917 which laid down the general principles for the rationing of grain to consumers. This order introduced a maximum for the size of rations. Different maximum scales of rations were introduced for different groups. In general the inhabitants of rural districts were set a maximum ration the same size as the ration allowed grain producers. In urban areas a much lower maximum norm of 0.123 tons of flour per head per year (probably between 0.15 and 0.16 tons of grain)[3] plus 0.015 tons of groats[4]. For those employed in heavy physical labour an addition to these maxima by 50% was allowed.

It should be emphasised that these were all maximum-levels for rations and were in no way meant to form an obligation. In most urban areas the level of rations that were actually distributed were much lower than these maxima.

1. See K.I.Zaitsev and N.V.Dolinsky, ibid., pp.99-100.
2. See K.I.Zaitsev and N.V.Dolinsky, ibid., p.100.
3. This of course depends on the extraction rate of flour at the time, which could have been between 75 and 80%.
4. See K.I.Zaitsev and N.V.Dolinsky, ibid., p.109.

c) Data on grain used as livestock feed

The estimation of the quantity of grain used as a supplement to livestock feed is an extremely complex problem. It depends upon the quantity, type, age, size and quality of livestock. It depends upon what the livestock are doing, where they are kept. In severe climates, like those of much of Russia much of the animals' food intake will be generated into heat energy to keep it warm through winter, hence the importance of the severity of the climate and the quality of the shelter. But most of all it depends upon what other forms of livestock feed are being used and what the nature of the fodder balance is. Grain is a far less major element in the animal feed balance than it is in the human food balance. Whereas in human feeding patterns at this time grain accounted for over 65% of all carbohydrate intake and over 70% of all protein intake[1], for livestock feed, grain accounted for less than 25% of all carbohydrate and starch intake. The task is therefore, not of estimating the basic element in the diet, but rather of estimating just a supplement. And whereas there was a considerable degree of stability in the basic item in the human diet, there can be expected to be a far smaller degree of stability in the amount of grain supplement added to the basic livestock feed. But on the other hand we must not forget that the Russian peasant would not struggle to keep alive emaciated animals, and if he failed to have sufficient feed concentrates available to keep his livestock alive over winter, instead of cutting down their feed rations, he might well decide simply to slaughter some of the animals.

In the following sections I will discuss i) the available data on the quantity and type of livestock, its regional location and very

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1. See S.G.Wheatcroft, SIPS No.2, Birmingham 1976, pp.94-95.

very briefly who owned it, ii) the available data on livestock feed norms and patterns of fodder getting.

i) The available data on livestock numbers

Livestock statistics with the exception of data on horses were the worst branch of pre-revolutionary agricultural statistics. Their reliability is worse than that of any other branch. Data on the number of livestock were included in the annual gubernorial accounts. These data, like the equivalent grain production data were based on the assessments of the local uezd police and then aggregated in GSK. Some of these early series of data, covering rural livestock held in the 49 provinces of European Russia were published by I.Vilson in the early editions of the Department of Agriculture Compendium to the Economico-Statistical Atlas[1]. Later the veterinary department of the Ministry of Internal Affairs was to annually aggregate these gubernia totals and these were also published in the Ministry of Finance annual[2].

Apart from data on horses, which I will return to no special system of collecting these livestock statistics was introduced in the 1880s. Here the position differs from that for grain statistics. Only from 1900 did TsSK begin to include questions on livestock on the sown area questionnaires that it sent out[3]. And the results from this investigation were published in the TsSK statistical annuals. For horses the sources of statistical data were much better.

The military reforms of 1874, which had set about modernising the army and the conscription system, also required an accurate and regular

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1. See Obyasneniya k khozyaistvenno-statisticheskomu atlasu Evropyeiskoi Rossii, various editions from 1851-69.
2. Yezhegodnik Ministerstva Finansov.
3. See Svod statisticheskikh svedenii po sel.khoz.Rossii k kontsu XIX veka, vyp.II, SPb.1903, p.iii. For an account of the TsSK questionnaires which had been regularly sent out since 1883 see above p.9

registration of horses which could be of use to the army in the eventuality of war. The authorities were interested in assessing draft animals as well as cavalry horses. In line with this requirement a series of regular military horse censuses were introduced. The first experimental census, covering only three gubernii was carried out in 1875. An attempt to expand this to 33 gubernii in the following year proved unsuccessful, but only in 1882 was a successful census carried out covering most of the gubernii in European Russia. The census was then repeated every four or five years until 1912, the last military horse census before the War[1].

These censuses were very elaborate as they involved a military veterinary examination as well as just a head count. Only the barest details of numbers and age by region were published in the civilian press. The zemstvo statisticians also collected some data on livestock numbers, but as already explained above there was little uniformity in the coverage and methods of collecting data in the different gubernii before the War.

During the War, there was organised the first All Russian Agricultural Census in 1916 which included all livestock for the first time[2]. The results of this census were most unexpected, and caused the reliability of the livestock statistics to be even more greatly questioned.

Although it had been generally believed that the military requisitioning of horses and meat animals, and the decline in rural population would have led to a sharp decline in the numbers of livestock

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1. See A.I.Goluzov, Ocherki istorii otechestvennoi statistiki, M.1972, pp.128-29, and V.E.Den, Kurs Ekonomicheskoi Geografii, L.1925, p.359. Censuses were carried out in 1882 in 59 gubernii, in 1888 and 1891 in 58 gubernii, in 1893/4 and 1896 in 53 gubernii and the Caucasus, in 1899/1901 and 1903/4 in 47 gubernii in the Kalmitskaya Steppe and the Caucasus, in 1905/08 in 37 gubernii, in 4 Siberian gubernii, and 2 oblasts of Central Asia, and in 1912 in 78 gubernii of the entire Empire.

2. For an account of this census see above.

the results of the 1916 census appeared to indicate that there had in fact been a sharp increase in the numbers of livestock during the War. A.E.Lositsky, who had been directly involved in the central organisation of the census, before the beginning of his career as director of statistics of the Ministry of Food, and head of the TsSU department of food consumption statistics, had been one of the first to write explaining that a revision was necessary. While admitting that it was doubtful whether there had actually been an increase in the number of livestock during the war, Lositsky did accept that the census showed that there certainly had been no decline[1]. From this time onwards the 1916 livestock figure has normally been accepted as the best available indicator of pre-war livestock levels and is still officially accepted as such.

This view however has been sharply undermined by A.L.Vainshtein's analysis of all the available series of data. Vainshtein has compared[2] the different pre-war and 1914-16 sources of livestock data for comparable areas and concluded that although the data of the veterinary department is by far the most complete, that it still grossly under-estimates the real level of livestock, especially the number of younger animals.

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1. Lositsky's article initially appeared in Russkaya Vedomost, in 1916. I have not yet seen this article so can only refer to it indirectly as referred to in A.E.Lositsky, 'Sovremennoye sostoyaniye skotovodstva v Rossii, M.1924, p.5, and in A.L. Vainshtein, 'Iz istorii predrevolyutsionnoi statistiki zhivotnovodstva' in Ocherki po istorii statistiki SSSR, No.3, M.1960, pp.86-115. And although Vainshtein's account seems to demolish the arguments advanced by Lositsky, an examination of Lositsky's 1916 article is needed.

2. See A.L.Vainshtein, in Ocherki po istorii statistiki SSSR, No.3, M.1960, pp.86-115.

Vainshtein's comparisons are given below:

Animal	Census data	TsSK data	Correction required
Horse			
0-4 year old	9.39	6.48	+44.85%
4+ year old	22.05	19.76	+11.61%
All horses	31.64	26.24	+19.82%
Cattle	50.47	35.67	+41.5%
Pigs	19.28	10.19	+89.2%

Source: A.L.Vainshtein, ibid., M.1960, pp.102, 104.

Unfortunately Vainshtein failed to give a regional breakdown of the correction coefficients, and he also failed to publish the TsSK 1916 figures with a regional breakdown[1]. Consequently we have no way of calculating our own regional correction coefficients. In his article Vainshtein himself recommended accepting the TsSK series as providing the best indication of the intertemporal dynamic[2]. In the series that I have calculated I have accepted the uncorrected TsSK data for the pre-war period. But during the war time, since no regional TsSK figures have been published I have been forced to make a comparison between the TsSK data and the agricultural census data. A comparison with no correction at all would provide a most misleading picture, consequently I have had to resort to applying the total disaggregated correction to all the regional figures without discrimination. This is bound to be a rather imprecise operation, but in the absence of any regionally differentiated correction norms there appeared to be no alternative.

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1. These figures had never been published and so Vainshtein must have got hold of them through some archive, presumably the TsSU archive. But he failed to give any reference to his sources. This is very untypical behaviour for Vainshtein who is normally most meticulous in these matters.

2. See A.L.Vainshtein, ibid., p.113.

Before giving an account of the change in the numbers of livestock over this period and their distribution by region I will just describe in a few words the relative importance of the different kinds of livestock. A detailed account of the feed norms per animal will be given in the next section, but a rough indication of the relative importance of the different animals will be of some use now as we look at their changing numbers.

The only livestock that we are concerned with are horses, cattle and pigs. In as much as sheep consumed hardly any grain at all they will not be included in this analysis. Horses were by far the most important grain consuming animal. Although feeding levels varied quite significantly throughout the country, taking the country as a whole the average horse consumed between three and four times as much grain as the average cattle or pig, and slightly more than the average human. Horses accounted for about 70% of all livestock grain feed, cattle for about 23% and pigs for only 7%. The number of horses, cattle and pigs in the different regions are indicated in the following tables for all readily available years[1].

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1. See appendix for the sources of data and for its regroupings. F.A.Cherevanin wrote a section on the effect of harvest fluctuations on agriculture 1883-1923 including the effect on livestock numbers in V.G.Groman (ed.), Vlyaniye neurozhaev na narodnove khozyaistvo Rossii, chast 1, M.1927, pp.160-301. But this was far less thorough in its presentation of data than were the earlier cited sections written by Obukhov (grain yields and production) and by Zaitsev (population). Only a few scattered figures for livestock numbers in 1888,1891,1892 and 1896-98 covering mainly the CPR were given. It would no doubt be possible to compile a more complete regional series from the different editions of the Yezhegodnik Ministerstva Finansov and other sources, but that task lies beyond the scope of the present thesis. Here I have restricted myself to the early average regional figures given by I.Vilson, the figures for 1883 and 1900 given in Svod.stat. svedenii....,vyp.II, SPb., 1903, the 1901-14 data given in the separate TsSK annuals, (Statisticheskii Yezhegodnik Rossii....,) from 1903-15 and the scattered figures for the CPR in the 1880s and the 1890s given by F.A.Cherevanin. Figures for 1916 and 1917 come from N.D.Kondratiev (ed.) Selskoye khozyaistvo Rossii v XX veka, M.1923, and from various volumes of Trudy TsSU

The numbers of horses held by the rural population in mlns

Year	NCR	SCR	SPR	CPR	EPR	USSR	50gub
1842/50	4.95		(2.27)	5.75			
1851/60	4.70		(2.14)	6.22			
1859/64							15.50
1864/69							15.50
1881							15.53
1882							15.52
1883	4.31	—	(4.5)	6.24			17.37
1887							15.78
1888				7.17			19.66
1890							19.78
1891				7.50			17.31
1892				5.31			16.68
1894							16.68
1895							[illegible]
1896							16.78
1897							16.88
1898							16.98
1899							19.82
1900	4.65		6.45	5.37			16.74
1901	4.63	(1.7)	6.42	6.18	(8.23)	27.16	[illegible]
1902	4.67	(1.7)	6.83	6.29	(8.44)	27.70	20.48
1903	4.62	(1.7)	6.47	6.56	8.80	27.84	21.35
1904	5.15	(1.7)	7.43	7.38	8.88	28.24	20.75
1905	5.00	(1.7)	6.83	7.36	7.65	28.54	20.78
1906	4.96	(1.7)	7.08	7.19	7.97	28.79	20.47
1907	4.89	(1.7)	6.76	6.92	7.75	27.67	20.48
1908	4.89	(1.7)	6.98	6.64	8.13	28.34	20.60
1909	4.88	1.72	7.07	6.85	8.72	29.94	21.32
1910	4.94	1.66	7.25	6.87	9.[illegible]	29.94	21.87
1911	4.96	1.60	7.50	7.16	10.14	31.36	21.82
1912	4.86	1.56	7.52	6.85	9.37	30.16	21.22
1913	5.00	1.54	7.91	6.78	9.69	30.72	21.61
1914	5.04	1.51	8.12	7.17	10.01	31.85	
1912	4.70	(1.6)	7.23	7.25	9.94	30.72	
1916	4.96	(1.6)	8.40	7.79	12.77	35.52	
1917	4.92	(1.6)	(8.02)	7.55	9.00	31.12	
Annual average growth rates							
1846-83	-0.3%		+2.1	+0.2%			
1883-1900	+0.5%		+3.9%	+3.1%			+3.6%
1901-14	+0.7%		+2.8%	+1.2	-1.7%	+1.3%	+0.8
1909-14	+0.7%	-2.4%	+3.0%	+1.9%	+3.0%	+2.0%	

Sources: see appendices

Numbers of cattle held by the rural population in mlns.

Year	NCR	SCR	SPR	CPR	EPR	USSR	50 gub.
1847/50	7.07		(9.42)	6.16			
1851/60	6.36		(8.38)	5.36			
1859/64							20.97
1881							22.12
1882							21.73
1883	5.96		(10.30)	5.61			23.19
1887							23.07
1888				6.48			24.91
1890							25.53
1891				6.22			25.32
1892				5.28			23.97
1894							24.07
1895							24.52
1896							29.55
1897							30.71
1898							30.15
1899							30.94
1900	8.49		(14.30)	8.15			31.66
1901	7.87	(4.2)	12.74	7.45	8.78	41.04	31.90
1902	7.96	(4.2)	12.76	7.60	9.47	41.97	32.18
1903	7.65	(4.2)	12.69	7.86	9.60	42.0	31.84
1904	8.02	(4.2)	11.32	7.89	8.04	39.47	31.87
1905	8.71	(4.2)	12.77	9.75	9.79	44.72	31.19
1906	8.72	(4.2)	12.54	8.90	9.94	40.10	30.51
1907	8.57	(4.2)	13.04	7.50	10.09	43.40	29.68
1908	8.43	(4.2)	12.61	7.73	10.21	43.18	29.69
1909	8.40	4.19	11.38	7.87	10.44	42.28	30.49
1910	8.60	4.37	11.51	8.26	11.59	44.33	31.31
1911	8.60	4.26	11.64	8.65	12.29	45.44	31.02
1912	8.65	4.49	11.67	7.99	10.74	43.54	30.92
1913	9.06	4.27	12.01	8.02	11.65	45.01	32.03
1914	8.88	4.07	12.16	8.44	12.39	45.94	
1916	9.74	(4.0)	13.66	11.59	17.36	56.35	
1917	(9.86)	(4.0)	(13.67)	10.69	(12.95)	(51.17)	
Annual average growth							
1846-83	-0.3%		+0.2%	-0.2%			
1883-1900	+2.7%		+2.4%	+2.8%			
1901-14	+0.4%		-0.4%	+1.0%	+3.2%	+0.9%	
1909-14			-0.6%				

Sources: See appendices.

Numbers of pigs held by the rural population in mlns.

Year	NCR	SCR	SPR	CPR	EPR	USSR	50 gub.
1842/50	2.39		(3.30)	3.10			
1851/60	2.04		(3.53)	2.89			
1859/64							
1881							9.26
1882							8.95
1883	1.68		(3.85)	2.32			9.10
1887							9.72
1888				2.32			9.24
1890							9.55
1891				1.57			9.55
1892				1.14			8.83
1894							8.83
1895							9.19
1896							13.26
1897							12.92
1898							11.98
1899							11.57
1900	2.74		(4.31)	2.34			11.76
1901	2.43	(0.3)	5.05	2.12	1.04	10.94	12.12
1902	2.44	(0.3)	4.62	2.03	0.94	10.33	11.65
1903	2.34	(0.3)	4.65	2.05	1.13	10.47	11.44
1904	2.53	(0.3)	4.64	2.22	1.14	10.83	11.99
1905	2.41	(0.3)	4.40	2.43	1.26	10.80	11.47
1906	2.41	(0.3)	4.20	2.21	1.48	10.60	11.86
1907	2.30	(0.3)	4.41	1.72	1.53	10.26	11.57
1908	2.29	(0.3)	4.24	1.96	1.48	10.27	11.39
1909	2.28	0.30	4.12	1.77	1.64	10.11	11.33
1910	2.28	0.41	4.31	2.01	1.61	10.62	12.05
1911	2.21	0.42	4.58	2.52	1.88	11.61	12.65
1912	2.50	0.36	4.74	1.94	1.43	10.97	10.63
1913	2.56	0.43	5.00	2.05	1.57	11.61	11.1
1914	2.63	0.49	5.13	2.26	1.91	12.42	
1916	3.95	(0.5)	6.97	3.99	4.81	20.22	
1917	4.40	(0.5)	(8.60)	4.96	3.46	(21.92)	
Annual average growth							
1846-83	-0.6%		+0.4%	-0.5%			
1883-1900	+3.9%		+0.7%	+0.1%			
1901-14	+0.6%	+12.7%	+0.1%	+0.5%	+6.4%	+1.0%	

Sources: See appendices

In order to get a better appreciation of the relative importance of livestock in the different regions over time, I have calculated the numbers of livestock per head of population. These indicators are presented in the table below:

Numbers of livestock per head of all population

Year	NCR	SCR	SPR	CPR	EPR	USSR
Horses						
1850s	0.271		0.141	0.378		
1883	0.194		0.197	0.286		
1891				0.306		
1892				0.215		
1900	0.170		0.207	0.233	0.504	0.247
1905	0.172		0.197	0.245	0.415	0.237
1910	0.160	0.182	0.193	0.213	0.433	0.228
1914	0.155	0.155	0.200	0.206	0.428	0.226
Cattle						
1850s	0.367		0.553	0.326		
1883	0.268		0.452	0.257		
1891				0.254		
1892				0.214		
1900	0.312		0.457	0.298	0.540	0.373
1905	0.299		0.368	0.307	0.531	0.371
1910	0.279	0.480	0.306	0.256	0.544	0.338
1914	0.272	0.417	0.300	0.242	0.529	0.326
Pigs						
1850s	0.118		0.233	0.176		
1883	0.076		0.169	0.106		
1891				0.064		
1892				0.046		
1900	0.101		0.138	0.085	0.064	0.099
1905	0.083		0.127	0.084	0.068	0.090
1910	0.074	0.046	0.115	0.062	0.076	0.081
1914	0.081	0.050	0.127	0.065	0.082	0.088

Sources: See appendices

It can be seen from these figures that with the exception of pigs in the EPR and horses in the SPR between the 1850s and 1900[1], there was quite a distinct decline in the per capita number of livestock in all regions over this period. Of course if the figures had been calculated per capita of the rural population the decline would not have appeared quite so bad, but it would not have made very much difference[2]. Overall the fact that the livestock level was growing more slowly than the population was indisputable. From the middle of the century until the 1880s there was even an absolute decline for horses, cattle and pigs in the NCR and for cattle and pigs in the CPR. Although the growth rate for horses remained fairly high at the beginning of the twentieth century in the SPR, there was an absolute decline in the number of cattle. This was probably more an indication of the declining quality of pastureland as the grain sown area was expanded, than of a shortage of grain for forage.

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1. This was the period when the Ukraine was being opened up for grain exports. We see during this period a sharp decline in the per capita number of cattle and pigs. The increase in horses was an indication of a move from food animals to draft animals associated with grain production.

2. The statistical problems involved in making corrections to the urban and rural population figures make it advisable to calculate per capita indices on the basis of all the population wherever possible.

The wartime data on livestock numbers

As explained above, the comparison between the uncorrected TsSK data and the agricultural census data for 1916 gives a highly misleading picture of livestock growth over this period, but we have no adequate regionally differentiated correction coefficients to apply to these data. The following figures have consequently been corrected with Vainshtein's regionally undifferentiated correction coefficients. The results should be accepted with caution.

	NCR	SPR	CPR	EPR	USSR -SCR
Horses					
1914 TsSK uncorrected	5.04	8.12	7.17	10.07	30.40
1916 census uncorrected	4.96	8.40	7.79	12.37	33.52
apparent change	-1.6%	+3.4%	+8.6%	+27.6%	+11.5%
1914 corrected (+19.8%)	6.04	9.73	8.59	12.06	36.42
revised apparent change	-17.9%	-13.6%	-9.3%	+2.5%	-8.0%
Cattle					
1914 TsSK uncorrected	8.88	12.16	8.44	12.39	41.87
1916 census uncorrected	9.74	13.66	11.59	17.36	52.35
apparent change	+9.7%	+12.3%	+37.3%	40.1%	22.7%
1914 corrected (+41.5%)	12.57	17.21	11.94	17.53	59.25
revised apparent change	-22.5%	-20.6%	-3.0%	-1.0%	-11.6%
Pigs					
1914 TsSK uncorrected	2.63	5.13	2.26	1.91	11.93
1916 census corrected	3.95	6.97	3.99	4.81	19.72
apparent change	+50.2%	+35.9%	+76.5%	+151.8%	+62.8%
1914 corrected (+89.2%)	4.98	9.71	4.28	3.61	22.57
revised apparent change	-20.7%	-28.2%	-6.8%	+33.2%	-12.4%

Sources: Calculated from the regional data presented in the appendices and from Vainshtein's regionally undifferentiated correction coefficients.

We consequently see a sharp decrease in the livestock levels instead of the apparent increase. The decrease is far more significant in the NCR and SPR than in the CPR or EPR. In the latter there was even an increase in the number of horses and pigs, even after the corrections had been applied.

There should be less problems involved in assessing the changes in livestock levels between the 1916 and 1917 censuses. The data for these years are presented in the following table:

	NCR	SPR	CPR	EPR	USSR
Horses					
1917	4.92	(8.02)	7.58	9.00	31.12
1916	4.96	8.40	7.79	12.77	35.52
% change	-0.8%	-4.5%	-2.7%	-29.5%	-12.4%
Cattle					
1917	(9.86)	(13.67)	10.69	(12.95)	(51.17)
1916	9.74	13.66	11.59	17.36	56.35
% change	-1.2%	0	-7.8%	-25.4%	-9.2%
Pigs					
1917	4.40	(8.60)	4.96	3.46	(21.92)
% change	+11.4%	+23.4%	+24.3%	-28.1%	+8.4%

Sources: see appendix

Note: the data in brackets refer to figures where absent data have been estimated by extrapolation.

These figures indicate a quite distinct change in the earlier pattern. The EPR, which had earlier suffered relatively less than the other regions now experiences a far more sharp decline, which brings it more in line with the other regions. The NCR which had formerly suffered the most now suffers the lowest regional decline in horse numbers. But most curious of all there is an apparent increase in the number of pigs in all regions apart from the EPR. Whether this is just a statistical phenomenon caused by some change in registration or whether it was a true reflection of reality I am not at all sure.

Livestock data according to the different types of producer

Neither Nifontov nor Kovalchenko provided any data on the levels of livestock held by the different types of producer across the whole country. Figures are available from various statistical handbooks for 1900, for the military horse census data for 1912 and again from the 1916 agricultural census, and they indicate the following changes in the relative share of peasant ownership of all rural livestock:

	NCR	SCR	SPR	CPR	EPR	USSR	European USSR
Horses							
1900	86.2%		77.7%	88.6%	96.9%		85.5%
1912	90.1%		75.1%	90.7%			86.8%
1916	95.7%	98.0%	90.2%	95.9%	99.6%	96.0%	
Cattle							
1900	83.0%	-	76.7%	85.7%	97.6%		82.8%
1916	96.0%	98.6%	91.0%	95.7%	99.4%	96.2%	
Pigs							
1900	84.4%		81.5%	86.2%	97.9%		84.3%
1916	97.2%	98.0%	93.7%	95.4%	99.6%	96.3%	

Sources: 1900, Svod statisticheskikh svedenii po sel.khoz.Rossii k kontsu XIX veka, vyp.II, SPb., 1903, pp.2-5

1912, A.M.Anfimov, Krupnoye pomeshchichye khozyaistvo Evropyeiskoi Rossii, M.1969, p.65 and N.D.Kondratiev (ed.) Sel.Khoz.Rossii v XX veke, M.1923, pp.207-13,

1916, A.Gayster (ed.), Osnovniye elementy sel.khoz. proizvodstva SSSR, 1916 i 1923-27 gg., M.1930, pp.90-9.

See appendix

Notes: The 1912 data for horses refer to horses aged 4 and above only. The horse data from all other sources refer to all horses.

These data indicate the very sharp change in ownership of livestock that had come about from 1900, and particularly, it would appear from the horse data, during the war. This is just another indication that the 1916 indications of the relative importance of the pomeshchik is by no means typical of the pre-war period.

The regional aspect of the above data indicates again the greater significance of the pomeshchik in the SPR and his relative insignificance in the EPR.

The Anfimov data for 1916 again enables us to get a more detailed picture of the distribution of livestock between the different groups of pomeshchik grouped according to their sown area. See the following table:

Sowing Groups	All households	Work horses in thousands 1915	1916	Cows in ths. 1915	1916	Number of livestock per household Horses 1915	1916	Cows 1916
0	7,970	32.9	30.4	29.9	27.2	4.1	3.8	3.4
0-10 des.	16,463	42.9	41.2	59.9	52.0	2.6	2.5	3.2
10-50	28,275	214.3	187.5	206.6	166.6	7.6	6.6	5.9
50-100	14,065	220.6	194.0	167.4	137.6	15.7	13.8	9.8
100-250	10,286	362.2	316.7	214.6	178.6	35.2	30.8	17.4
250-500	4,411	312.3	275.7	127.2	109.1	70.8	62.5	24.7
500-1000	2,020	220.6	200.6	60.2	55.7	109.2	99.3	27.6
1000-5000	681	134.7	126.5	34.2	33.6	197.8	185.8	49.3
5000+	11	6.9	7.0	1.4	1.3	627.3	636.4	118.2
All	84,183	1,547.4	1,379.6	901.4	761.5	18.4	16.4	9.0

Sources: A.M.Anfimov, Rossiiskaya derevnya v gody pervoi mirovoi voinyi M.1962,pp.98, 119,151

A.M.Anfimov, Krupnoe pomeshchichye khozyaistvo Evropyeiskoi Rossii, M.1969, pp.234-5.

Again we see the large number of livestock per household and the highly skewed nature of its distribution. By comparison we should point out that the average peasant household in 1916 was recorded as having 1.6 horses, more than ten times less than the average pomeshchik household, and 1.2 cows seven and a half times less than the average pomeshchik[1].

1. These averages are calculated from A.Gayster (ed.) ibid., M.1930, pp.2, 90.

But if we relate the number of horses to the sown area of each group we get a very different picture. We see that the peasants used a much larger number of horses per unit area sown than did the average pomeshchik household. The peasants had 41.9 horses for every 100 desyatiny sown, whilst the pomeshchiki had only 19.5 horses for the same area sown[1]. If we look at the Anfimov data for different types of landowner household we can see that the larger the area sown the smaller the number of horses per unit of sown area:

	Sown area in th.des.	No.of horses in th.	Horses per 100des sown area	Sown area in th.des.	No.of horses in th.	Horses per 100des. sown area
0		32.9			30.4	
0-10	108.3	42.9	39.6	65.9	41.2	62.5
10-50	867.4	214.3	24.7	713.8	187.5	26.3
50-100	1065.9	220.6	20.7	925.2	194.0	21.0
100-250	1877.9	362.2	19.3	1496.9	316.7	21.2
250-500	1636.5	312.3	19.1	1543.2	275.7	17.9
500-1000	1376.6	220.6	16.0	1324.2	200.6	15.1
1000-5000	1079.0	134.7	12.5	1054.0	126.5	12.0
5000+	75.1	6.9	9.2	70.4	7.0	9.9
All	8197.0		18.9	7194.4	1379.6	19.2

Sources: A.M.Anfimov, ibid., M.1962, pp.119,138.

This is another reason why the unit costs of production on these large estates were less than on the small and why there were more grain surpluses produced on them. However, I must make two qualifying remarks concerning this indication of the numbers of horses on pomeshchik estates.

First, there is no indication given of the extent of hiring labour with horses. This may affect the position. Secondly, no account has

been made for quality aspects. The landowner horses were quite noticeably larger than the peasant horses[1], and the dairy herds contained some very fine animals, all of which would have consumed more than the average peasant animal. Nevertheless these factors are only likely to have a marginal effect on the overall differences described above.

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1. The military horse census measured the horses and in 1912 it was reported that 67.8% of landowner horses were more than two arshin tall (1.42 metres) while only 43.7% of peasant horses were that tall. (Voenno konskii perepis 1912g., Pg.1914, pp.16-35, cited by A.M.Anfimov ibid., M.1962, p.114)

c)

ii) The available data on livestock feed norms and patterns of fodder getting

The earliest livestock feed norms were often given not in terms of the quantity of grain per head of livestock but in terms of the quantity per head of the rural population. In the earlier section of this chapter concerned with food consumption norms it was described how Protopopov argued that a personal consumption norm of 3 chetverts per head of all the population was too large, and that it would be reduced to 2 chetverts or should be considered to include livestock feed[1].

From this it can be inferred that Protopopov considered that 1 chetvert per head of all the population would provide sufficient grain to cover livestock feed.

Since the level of livestock per head of the population changed quite significantly over this period and differed from region to region, this kind of procedure can clearly only be very rough.

In the 1850s Tengoborskii estimated that livestock would consume on average 1 chetvert of grain per head of livestock per year. Since the grain was likely to be oats 1 chetvert would weight 0.092 tons. The different kinds of livestock were presumably converted into their horse equivalents[2].

Several years later, in 1869 when I.Vilson came to draw up his early grain forage balance he accepted a livestock feed norm for horses only, which he gave as 2½ chetverts per year[3]. (Assuming again that the

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1. See above p.99
2. See Tengoborskii, O proizvoditelnyikh silakh Rossii, SPb 1854 pp.198-202, cited here from P.I.Popov, in Selskoye khozyaistvo na putyakh vosstanovleniya, M.1925, p.3.
3. See I.Vilson (ed.) Obyasneniya k khoz.stat.atlasu Evropeskoi Rossii, SPb, 1869, p.106.

grain was oats, this would mean 0.23 tons per year per horse). Vilson justified the use of such a norm from the investigations of Ya.A. Solovyev in Smolensk Gubernia and he also added that this was the order of magnitude officially accepted by the Ministry of State Property.

I have not been able to trace Solovyev's work, and the earliest serious investigation of livestock feed that I have come across was that of L.N.Maress in the late 1890s. The following account of livestock feed patterns and feed norms appeared in Maress's already cited work on the production and consumption of grain in a peasant household, which he wrote for the Chuprov and Posnikov edition of articles on the effect of harvest levels[1].

Maress stated that hay was the main item of livestock feed but it was always to some extent supplemented by more nourishing grain (mainly oats and barley but in certain cases also wheat and rye as well as mill-feed). A grain supplement was given especially to horses doing demanding work particularly in the worst weather and in winter; to all animals giving birth and suckling their young; to young animals and to pigs, poultry and other animals for fattening. The quantity of grain used to supplement feed was far less than in western Europe and northern America at this time, but this appears to be mainly due to the smaller and weaker nature of the animals rather than to their getting sufficient alternative feedstuffs. Maress noted that the actual amount of grain used to supplement feed was very difficult to estimate with any degree of accuracy, and warned that the norms that he was applying were very tentative. His norms were based on the data of a few budget studies of fodder norms in volosts around St.Petersburg, and around Voronezh.

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1. See L.N.Maress, in A.I.Chuprov and A.S.Posnikov (eds.) Vliyaniye urozhaev i khlebnikh tsen... SPb 1897.

Maress calculated the average annual grain supplement to feed to be 18.3 pds (0.300 tons) of oats per horse and 10 pds (0.164 tons) per cow or ox, and one tenth of this per head of smaller livestock (e.g. sheep and pigs). On average assuming there were per household 1.48 work-horses which consequently required 27.1 pds (0.444 tons) of oats, 1.52 cows and oxen, and 7.14 smaller livestock (equivalent to 0.71 cows or oxen) requiring 0.365 tons of grain supplement to hay[1]. Finally Maress allowed 7.4 pds (0.121 tons) of grain for poultry feed. This gave a total productive consumption per agricultural household per year of grain supplement to livestock feed of 0.930 tons of grain. Allowing an average of 6 persons per household, this gives an average annual consumption of grain supplement to fodder of 0.123 tons per head of agricultural population.

Chayanov's study also gave an analysis of the feeding norms for livestock. He also emphasises that this is a topic that had been little studied in the past and was of fundamental importance for the food supply plan. But as already explained the construction of livestock feed norms was far more complicated than the construction of personal consumption norms for the population and the norms were far less stable. Different types of livestock required different quantities of fodder. These differed by area, by type of households and according to the method of organising the livestock sector and fodder-getting. Apart from this the substitution of different types of fodder was far more significant and grain played a far less fundamental role in the consumption of

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1. Maress received figures of number of animals per household from the work of Blagoveshchensky Svodnyi statisticheskii sbornik khozyaistvennoi svedenii po zemskim podvornim perepisyam, Vol.1 The data was a collection of zemstvo surveys from a sample covering 123 uezds in 22 gubernii.

livestock than grain did in human consumption. Grain was used as a supplement to livestock feed predominantly in the winter months when the livestock was in stalls and could not graze for itself. The length of the stall period differed greatly for different regions. Generally it could be said that maintaining the livestock over the winter months was a much harder task in the typical Russian conditions of severe and long winters than it was in other more moderate climates so to this extent grain was more important for livestock in Russia than in other countries. The fact that at this time less grain was fed to the livestock in Russia than in other countries, explains the pitiful state of much of the country's livestock. It was impossible for larger animals to be bred while insufficient fodder was available for the livestock. Insufficient fodder was available a) because the pressure to increase the sown area led to a decrease of pastureland[1], and b) because much of the grain was exported, instead of being fed to the animals. In particular the major export crops barley and wheat were replacing oats as spring grown crops in the crop rotations which were used at this time.

Chayanov laid the basis for the study of livestock feed-getting by classifying feed-getting into three types. These types were arrived at by an analysis of the organisation of livestock feeding as revealed by budget studies in 5 gubernii. A brief review of Chayanov's analysis is given below:

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1. There was little movement towards intensive rotation and the production of specialised forage crops at this time.

Organisation of feed-getting (quantities per household; numbers unless otherwise stated)

	Vologda. uezd Vologda	Voronezh gubernia	Starobel uezd Kharkov	Volokolamsk uezd Moscow	Yaroslav gubernia
People	5.3	8.4	7.6	7.7	5.8
Arable (des.)	3.7	10.1	14.1	7.1	-
Feed area (des.)	6.1	1.2	2.3	2.2	-
Horses	0.9	1.6	1.0	2.5	-
Oxen and bulls	0	1.0	2.2	-	-
Cows	2.1	1.2	1.1	2.4	-
Small livestock	0.6	16.0	8.1	3.5	-
All livestock converted to cattle	3.6	7.8	6.8	6.1	-
Poultry	3.2	24.0	41.4	?	?
Expenditure on feed and litter in pds.					
Hay (Meadows)	499.0	108.8	173.4	298.4	
Hay (Clover)	-	-	-	429.0	397.2
Straw winter	93.0	594.0	417.7	271.0	?
Straw spring				92.1	
Chaff	26.2	143.0	196.5	-	-
Sprinklings (Prisipka)	6.1	34.0	52.8	.	0.9
Grain	24.0	40.0	31.8	56.6	32.5
Oilcakes	-	-	-	6.2	-
Other	-	-	11.8	-	11.4
Total	643.3	921.1	884.1	1153.3	?
Grain for Poultry	?	10.9	16.6	?	?

from: A.V.Chayanov Materialy.... vyp 1, M.1916, p.80.

Chayanov's three basic types of fodder-getting were:

1) The harmonic threefield type, typified by the above example from Vologda uezd. In this type the feed area is sufficiently large in comparison with the area of arable and 5/6 of all feed stocks are composed of hay collected from meadows.

2) The purely grain economy type, typified by Voronezh gubernia (and more or less common for all Chernozem regions). In this type the arable has spread to such a degree that the area for natural feed has been greatly diminished (in the case of Voronezh it accounts for only 10% of all the land). Feed-getting in these cases is dependent primarily on grain products: grain and straw. Hay in the case of Voronezh only accounts for 1/9 of all feed stocks.

3) The grass-lands system, typified by Volokolamsk uezd. The livestock are again fed mainly from the arable production. But in this case the arable supplies the livestock not only with the waste products left after human consumption, such as straw, but also with fine artificial hay from specially sown grasses. In the case of Volokolamsk the total hay collected accounts for 6/10 of the overall feed stocks and of this over 60% comes from sown grasses.

If we compare the quantity of grain fed to one unit of livestock (converted into long-horned cattle) for these different cases we see that in the Vologda extensive livestock system 6.7 pds of grain are fed to one head of cattle, in the Voronezh extensive grain economy case 5.1 pds per head of cattle, while in the more progressive intensive grasslands type economy of Volokolamsk 9.3 pds of grain were consumed per head. However if we include expenditure on sprinklings (prisipka)

the picture is reversed 8.3 pds for Vologda, 9.5 pds for Voronezh and 9.3 pds for Volokolamsk. In order to understand the situation more fully and be able to make conclusions it is necessary to analyse in more detail the content of the element of sprinklings. (How much of it is grain and how much other stuffs?). It stands to reason that with a decrease in the consumption of hay it requires an increase in consumption of grain and other foodstuffs to achieve the same effect. But it is very unlikely that the same effect (the same quality of livestock) was achieved in all these cases. Livestock bred on the intensive grasslands system and with large grain supplements was likely to be far more healthy and larger than that bred on more extensive systems with lower grain supplements, but to analyse this we would require statistics of the average weight of the respective livestock; such statistics were not recorded at this time or recorded very infrequently.

The above analysis would allow us to classify livestock breeding in all households into these three classifications and use the equivalent norms of grain supplement (with or without all of the norm for 'prisipka' expended) per household for the regions where these organisational patterns predominated, in order to calculate the overall expenditure of grain on feed. Limitations further to those mentioned above are that the above budget studies are not necessarily typical of the consumption for the whole of these areas. The most important variable was the number and type of livestock per household in different households. As a consequence of this Chayanov attempted also to analyse norms of consumption for different types of livestock.

Most statistical data on livestock feeding up till that time were collected in a most rough manner; one figure was given for the estimated

use of fodder by the whole household without sub-divisions for different animals. This is true for the five most detailed cases given above. Chayanov recorded in 1916 that only in literally four or five of the most recent investigations had sub-totals per type of animal been obtained. As an example of such an analysis Chayanov supplied the following table for Vologda uezd [illegible]

	Stall time (monthly)	Hay pds	Spring Straw	Chaff & Bran	Oats	Flour	Milk Returns
Horse	8.2	220.3		5.6	13.8		
Cow	7.1	90.3	44.7	12.5		1	18.6
Sheep	7.0	26.4	0.1	0.3			5.1
Foal	8.0	158.8	0.8	4.0	3.0		
Bullock	7.2	71.5	7.9	4.0			18.9
Calf-1yr.	5.2	18.9		0.9			30.2

From: A.V.Chayanov 'Materialy...' vyp 1, M.1916, p.81.

In addition to calculations by type of livestock and organisation of fodder-getting Chayanov also recommended the calculation of livestock norms according to length of stall period. He classified European gubernii into the following four regions as is shown below:

1) Region with stall period of less than 160 days included the following gubernii: Bessarabskaya, Khersonskaya, Tavricheskaya, Ekaterinoslavskaya, the southern oblasts of the Don Military region and Astrakhanskaya.

2) Regions with stall period of 160-80 days: Vilenskaya, Grodenskaya Minskaya, Mogilevskaya, Volinskaya, Podolskaya, Kievskaya, Chernogovskaya, Poltavskaya, Kharkovskaya, Kurskaya, Orlovskaya Kaluzhskaya, Tulskaya, Ryazanskaya, Voronezhskaya, Tambovskaya, Penzenskaya, Simbirskaya, Saratovskaya, Samarskaya, Orenburgskaya and the northern oblasts of the Don Military Region.

3) Regions with stall period of 180-200 days: Pribaltiiskaya, Kovenskaya, Vitebskaya, Smolenskaya, Moskovskaya, Yaroslavskaya, Vladimirskaya, Kostromskaya, Nizhegorodskaya, Kazanskaya, Ufimskaya.

4) Regions with stall period of over 200 days: Pskovskaya, Petrogradskaya, Novgorodskaya, Olonetskaya, Vologodskaya, Vyatskaya, Permskaya, Arkhangelskaya (250+).

However, in spite of all these recommendations on how the norms of livestock feed should be calculated and their future statistics organised, there was no attempt to reach detailed conclusions on the scant evidence that was so far available. Any pre-war norm would clearly have to be guesstimated on a very unsure basis; it would probably be best to estimate a norm per head of agricultural population, not per animal per stall period and classified according to the type of fodder-getting.

Lositsky obtained his operational livestock feed norms by using the earlier analyses of Chayanov and Popov. He simply combined the analysis by Chayanov in 1916, and obtained overall consumption figures for one head of livestock differentiated between the non-Cherno-zem and Cherno-zem gubernii. A detailed survey by Popov in Tula gubernia provided an indication of the proportions of livestock feed required by the different types of livestock. Lositsky admitted that the quantity and type of feed used was dependent on the system of fodder-getting as analysed by Chayanov; but Lositsky had been forced to assume that the average of the studies of Vologda, Volokolamsk uezds and Yaroslavl gubernia could be taken as being typical for all non-Cherno-zem regions, and that the average for Chayanov's studies of Voronezh and Kharkov gubernia was typical for the Cherno-zem regions. These were

simplifications and assumptions of heroic proportions.

	Vologodsky uezd	Volokolamsky uezd	Yaroslav gubernia	Voronezh gubernia	Kharkov gubernia
No.of livestock per household average in cattle.	3.6	6.1	3.0	7.8	6.8
Poultry	3.2	?	?	24.0	41.4
Use of fodder per head of livestock in pds					
Hay (meadow and clover)	140	120	132	14	25
Straw and chaff	33	60	?	95	90
Grain	6.7	9.3	10.8	5.1	4.7
Prisipka	1.7		0.3	4.4	7.8
Cattle cake etc.	-	1.	3.8	-	7.8
Grain per fowl	?	?	?	0.45	0.4

From: Lositsky, Urozhai khlebov v Rossii v 1917g., M.1918, p.23
(recalculated from A.V.Chayanov Materialy... vyp 1, M.1916,

The norms of consumption of feed for different animals were then calculated, 'on the basis of norms of giving grain and sprinklings (of grain stuffs) (prisipka) for one head of full grown livestock according to the two regions and in relation to the giving of it to large and small livestock and bullocks in Tula gubernia... and after the addition of well-known quantities for feed for horses during the summer'.

Category of livestock	Non-Cherno-zem	Cherno-zem
Horses (Work)	0.246 tons	0.262 tons
Other large livestock (non-work horses, cows, bullocks)	0.164 tons	0.180 tons
Small & average livestock (Foals,bullocks,pigs etc.)	0.088 tons	0.082 tons
Bullocks younger than 1 yr.	0.049 tons	0.049 tons

From: Lositsky, Urozhai khlebov v Rossii v 1917g., M.1918, p.26.

Rations for livestock feed

In assessing the grain levy in 1916 an allowance was also to be made for the amount of grain used as livestock feed in the grain producer households, but no centrally determined norm or ration was given for this. The law of March 25, 1917 set the following rations for the livestock belonging to grain producing households[1]:

for a draft horse 3.28 kilograms of Oats or Barley, or 4.10 kilograms of wheat per day for a maximum of 75 days i.e. a maximum of 0.246 tons of oats or barley, or 0.307 tons of wheat per horse per year.

for full grown cattle or pigs 1.64 kilograms of grain for a maximum of 60 days, i.e. 0.098 tons per year

calves more than a year old were allowed half the ration of a full grown cow i.e. 0.049 tons per year.

By September 1917, Lositsky reports that the Ministry of Food were using a much higher series of fodder norms[2]:

Full grown horse 0.410 tons per year,
Full grown cattle 0.197 tons per year,
Foal younger than 1 year 0.131 tons
Bullocks over 1 year 0.098 tons
Pigs 0.082 tons

The norms set for town horses by the Ministry of Food at this time (October 1917) were the following:[3]

Dray horses weighing more than 0.57 tons, 8.6 kilograms per day with no time limit, therefore up to 3.14 tons per year

Dray horses weighing between 0.29 tons and 0.57 tons, 7.4 kilograms per day, up to 2.69 tons per year

Dray horses weighing less than 0.29 tons, 4.1 kilograms per day, giving a maximum of 1.49 tons per year.

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1. See K.I.Zaitsev and N.V.Dolinsky, ibid., p.99.
2. See A.E.Lositsky, ibid., p.26.
3. See A.E.Lositsky, ibid., p.27.

These appear to be very generous norms. The March 1917 fodder rations were about the same size as the average norm given by Lositsky in his grain forage balance for 1917. But by September Ministry of Food norms were far higher.

d) Industrial use

Virtually all the grain used in human consumption was processed into flour. But very little of this was measured as part of the milling industry. Good statistics were kept for the large establishments which fell within the census definition of industry, but these only covered 2,705 mills in 1916, at the time of the 1916 census of the milling industry and they had an annual production of less than 12 million tons[1]. Since at least 35 million tons of flour were consumed by the population, the figures from the milling industry are likely to provide a very poor indication of the amount of grain milled. It will therefore be best to resort to the normed consumption data in order to assess the real size of the milling industry.

If we exclude the milling industry, other industrial uses of grain were relatively minor. The main grains, potatoes and sugar beet were all used in the distillation industry and barley was used in the malt-making and brewing industry. But less than 1 million tons were used in the factories of the distillation industry. About one half was malt coming from barley, about a fifth was rye, and a growing proportion, over a quarter was maize[2].

Less than a quarter of a million tons of barley was listed as being used in the brewing industry[3]. But these figures and all the available figures refer to large scale industry only. There were no ways of registering the production of illegal homemade spirit (samogon), and it was probably produced on a very large scale in the countryside. It required roughly 1 ton of grain to produce 2,000 litres of 40% alcohol[4]. If the average peasant household consumed 1 litre of alcohol a week that would account for the utilisation of another half-million tons of grain.

1. See Ezhegodnik khlebnoi torgovly., No.1, M.1928, pp.6, 42.
2. See Sbornik statistiko-ekonomicheskikh svedenii po sel.khoz.Rossii.., SPb.1916, p.194.
3. See Sbornik stat.ekon.svedenii...,SPb.1916, p.204.
4. See Sbornik stat.ekon.svedenii...,SPb.1916,p.178.

e) Grain consumed by the army

Throughout the nineteenth century the army had been one of the largest single consumers of grain. For the first half of the nineteenth century the size of military consumption was in all probability greater than exports. In the late nineteenth century and until the eve of the Great War the share of military consumption undoubtedly declined in comparison with total utilisation and especially with the growth in exports. But during the war military consumption rose rapidly to enormous and ultimately crippling proportions.

In this section I will consider i) the changes in the size of the army over this period, ii) the size of a soldier's ration, and iii) the direct data on procurements for the military.

i) The size of the army

Sir Bernard Pares has pointed out that the Russians have always had a large army: 'All through Russian history from the very beginning there have been testimonies to the great numbers of the Slavs and the almost irresistible power which they might have if ever they were united....We are surprised at the numbers of Russian troops mentioned by the early Western travellers to Moscow; they altogether exceed the proportions of Western armies'[1].

At Borodino, in 1812 Napoleon was faced by 120,000 Russian troops and under the reign of Nicholas I (1825-55) the size of the army was expanded to about 1 million which was well in excess of any two other European armies. At this time the army was based on a fairly random conscript system in which 1-2% of peasant males of eligible age served for 25 years. The serf owners and the village elders were responsible for selecting conscripts and they often used their power to punish

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1. Bernard Pares, A History of Russia', Methuen, London 1965, p.114

trouble makers or unpopular elements.

By the mid century the Russian population had grown at such a rate that the traditional 1-2% was leading to the recruitment of far more males than was needed for an army which was stabilising its size at about 1 million. The standard length of service was therefore allowed to drop to 15 years which was followed by 10 years leave during which the soldiers formed effectively a reserve army.

After the failure of the Russian army in the Crimean War (1854-56), and after the emancipation of the peasantry (1861) there were a whole series of military reforms, which ultimately led to a less arbitrary conscription system in which, on reaching the age of 21, a quarter of each male cohort was drafted into the army to serve on active service for seven years to be followed by eight years in the reserve. This again provided just over a million men on active service. In later years as the growth in population size continued to increase it was decided to cut the length of active service in order to gradually increase, and in August 1914 on the eve of the Great War the Russian Army stood at 1.423 million men[1].

The Great War resulted in a very sharp rise in the size of the army. Between August 1914 and January 1, 1915 5.115 million reservists were mobilised. Between January 1, 1915 and January 1, 1916 a further 5.01 million men were drafted. The following year we see the addition of a further 2.745 million men. And in the last year of the war in 1917 another 0.830 million men joined the army[2].

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1. For the above account on changes in the size and organisation of the Tsarist Army see: J.N.Westwood, Endurance and endeavour: Russian History, 1812-1971, OUP, 1973, pp.64-67, 95-97, 186; J.S.Curtiss, The Russian Army under Nicholas I, 1956, V.I.Kovalevskii (ed.) Rossiya v kontse XIX veki, SPb.1900, pp.952-59, and Trudy TsSU, vol.18, M.1924, pp.86-89.

2. See Nar.Khoz.SSSR v tsifrakh, M.1925, p.109

In order to calculate the size of the army at any one point during the war years, we have to deduct the losses; either killed or taken prisoner. The available data on deaths and other losses of prisoners are very inadequate. The Soviet demographer B.Ts.Urlanis has described how the poor state of the organisation of military statistics in the early months of the War has led to a large under-reporting of losses in 1914[1]. Altogether Urlanis suggests that there were 1.8 million deaths amongst the military in the 1914/18 war[2], and that there were several million taken prisoner.

Given the poor quality of the data on losses only very rough estimates of the size of the army at any given time can be made. Such rough estimates are given below:

Numbers of Soldiers in Tsarist Army in millions

Date	additions	losses killed,	POW	Total in army
August 1914				1.4
January 1915	5.1	0.4	1.0	5.1
January 1916	5.0	0.4	0.5	9.2
January 1917	2.7	0.4	0.5	11.0
November 1917	0.8	0.4	0.5	10.9

From these figures the average annual number of soldiers who required feeding every year rose in the following manner:

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1. B.Ts.Urlanis, Wars and Population, M.1971, (English edition), pp.46-55.
2. B.Ts.Urlanis, ibid., p.198. Of these 1.8 million deaths 0.2 mln. are estimated to have died in captivity.

	Calendar Year			Agricultural Year
1800-1830	about	300,000		300,000
1830-1905	about	1,000,000		1,000,000
1905-1914	about	1,200,000		1,200,000
1913		1,400,000	1913/14	1,400,000
1914	about	2,000,000	1914/15	6,000,000
1915	about	7,000,000	1915/16	9,000,000
1916	about	10,000,000	1916/17	11,000,000
1917	about	9,000,000	1917/18	

Unfortunately very few data are available on the number of horses and other livestock held by the army at this time. According to the detailed procurement data and the feeding norms, which will be discussed later[1], it would appear that in peace time there were on average about 3.3 soldiers per horse, while in war time the ratio rose to about 5.6. This includes both cavalry horses and general draft horses.

ii) The size of military rations

Data on the size of military rations current from the late eighteenth century to the mid nineteenth century have alread been described above[2]. They give a figure of 0.391 tons of flour and groats per soldier. The following table, taken from Kondratiev's major work, supplements these early data with an indication of the rations in 1869 and at certain times during the war, in tons per head per year:

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1. See p. 158
2. See above p. 98-99

Date	grain	flour	bread	groats	other	Total flour equivalents	grain
1758		0.356	0.258	0.025	-	0.381	
1775		0.356	0.258	0.038	-	0.394	
1869	0.373	0.281	0.261	0.037	0.006	0.324	0.416
16/1/1916	0.373	0.281	0.261	0.037	0.018	0.336	0.428
7/4/1916	0.448	0.337	0.299	0.037	0.037	0.411	0.522
28/12/1916	0.373	0.281	0.261	0.037	0.037	0.354	0.447
20/3/1917	0.299	0.224	0.261	0.037	0.037	0.298	0.373

Sources: Keppen, Zhurnal MVD, Vol.36, no.6, 1840, p.405.
N.D.Kondratiev, Rynok khlebov...., M.1922, p.183.

It can be seen that there was a remarkable degree of stability in the standard army ration until 1917. The standard amount of bread consumed in the ration hardly changed at all, although there were some significant changes in its flour and grain content. In the eighteenth century a larger amount of flour was used in the production of the standard army ration bread loaf. I am uncertain as to whether this was a consequence of a change in the method of baking the bread (e.g. the introduction of a more leavened bread which would require a larger share of water) or whether it was a consequence of some other change (probably in the standard of flour mixed from a unit amount of grain). From the middle of the nineteenth century the soldier appears to have been receiving a slightly larger loaf which was baked from slightly less flour, the bread to flour ratio having been raised from 0.725 to 0.929. The flour extraction rate from grain was reported to be 0.753 at this time. A certain amount of groats had always been given as a supplement (served as gruel or dropped into the soup). To this were added a small amount of peas, beans and other secondary grains, especially during the War. There appears to have been an attempt to increase the size of the ration in April 1916, probably as an attempt to boost morale. But as the

supply situation deteriorated after the 1916 harvest this increase had to be cancelled. But even the traditional level of rations could not be maintained under the Provisional Government. And in March 1917 the amount of grain and flour in the standard ration loaf was reduced. This appears to have been achieved without a reduction in the weight of the loaf. And consequently the loaf must have contained more water or other fillers. In the strained supply conditions of these times it is uncertain to what extent even this reduced ration was maintained.

Kondratiev also informs us that the standard military supply norm for feed for a horse during this period was 13.. lbs of oats per day for a normal horse and 12 lbs a day for a small horse[1], i.e. 2.053 tons per year for a normal horse and 1.79 tons per year for a small horse.

iii) Data on grain procurements and utilisation by the military

The system of prewar grain procurements for the army is a subject which has unfortunately been neglected by historians[2]. It is undoubtedly an extremely complex topic and I will only present the system in its most simple outlines.

In grain surplus areas grain could fairly easily be procured by the local quarter-masters with little disturbance to the local market. In other areas the military had to arrange its own provisioning; the purchasing of grain in other regions and their transportation into the

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1. See N.D.Kondratiev, ibid., M.1922, p.184.

2. N.D.Kondratiev's work on the grain market during the War and Revolution fails to provide an account of pre-war military procurements and thereby gives a rather misleading account of the rapidity with which the war-time procurement agencies were formed. The sole account of the pre-war procurement agencies that I have come across is a rather incomplete account given by the modern Soviet historian T.M.Khitanina, in T.M.Khitanina, Khlebnaya torgovlya Rossii v 1875-1914 gg.,L.1978, pp.95-103, 201-21, 255-65.

garrison area. Since the middle of the eighteenth century, these more complex inter-regional provisioning arrangements had been based on a system of contract supplies which had been overseen by an agency in the War Ministry called the 'Intendanstvo'. The 'Intendanstvo' set fixed prices for grain, which were considerably above the market price. But they did require their suppliers to provide high quality grain and on a regular basis. The contractors acted as middlemen between the producers and the army.

According to a figure prepared by P.I.Popov and V.I.Yefryemov from contemporary sources on the number of the military and their consumption rations[1], the army in the period from 1840s to the 1860s consumed annually about 0.7 mln.tons of grain[2].

Khitanina, citing Ministry of War data for total military procurements of grain products and forage in the 1870s and 1880s averaged about 3.5 mln.chetverts i.e. approximately 0.5 million tons a year[3]. Later in her work Khitanina cited from the Central State Military Historical Archives annual data for procurements by the 'Intendanstvo' for the 1890s

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1. See P.I.Popov, in Sel.khoz.na putyakh vosstanovleniya, M.1925, pp. 8,11,37. Popov states that these figures had been worked out by V.I.Yefryemov (head of the TsSU Department of Military Statistics), and were based on data from Voenno-statisticheskii spravochnik, vol. IV, SPb. 1871, and Entsiklopediya voyennikh i morskikh nauk, (ed. Lyeyer).

2. I.D.Kovalchenko in Russkoye krepostnoye krestyanstvo... M.1967, p.97 gives a much lower estimate of 1.95 mln.chetverts i.e. about 0.25 mln.tons. This is due to his failure to include any account of the military requirement for fodder.

3. See T.M.Khitanina, ibid., L.1978, p.95. No source or reference is given to this Ministry of War data. And Khitanina rather misleadingly implies that this figure is higher than Popov's.

which vary from 0.37 to 0.21 million tons[1]. Unfortunately Khitanina is very imprecise in stating what precisely these figures refer to. They certainly cover both food and fodder grains. The detailed figures for the 1890s certainly exclude local purchases by the local quartermaster[2], and may only include procurements in the European part of Russia. Given these reservations the figures do nevertheless provide an interesting indication of some fundamental changes in the procurement system. But first I will make a rough attempt to assess total military consumption requirements based on the size of the army and the size of the standard ration.

We have seen above that from the 1830s until 1905 the army numbered about 1 million, whereafter it gradually rose in numbers to about 1.4 million on the eve of the Great War. Given that the standard soldier's ration had a grain equivalent of 0.416 tons per year per soldier, we would expect about 0.42 million tons of grain to be required by the army annually, just for personal consumption from the 1830s until 1905, and then for the amount required to rise to 0.58 million tons. The Khitanina 1870s figure of 0.5 million tons total military procurements would allow just 0.08 million tons for livestock feed, which could only provide feed for 0.039 million horses. This would imply a ratio of 26 soldiers per horse. The Popov figure of 0.7 million tons would allow 0.28 million tons for livestock feed which would allow enough feed for 0.136 million horses. This would imply a ratio of 7.3 per horse, which I would suggest

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1. See T.M.Khitanina, ibid., L.1978, pp.208-209

2. This however does not stop Khitanina from referring to them as covering all military consumption (See T.M.Khitanina, ibid., L. 1978, footnote 58, p.95), which is clearly incorrect. She does not even bother to sum the individual series of figures which she reproduces from the archives, and so appears to be totally oblivious of the fact that they could not possibly cover all of military consumption.

is a much more likely number, and which is much more comparable with the kind of ratios implied by the more complete 1914-18 military procurements data.

The figures given by Khitanina are therefore far from complete, and represent at most only 50-70% of total military consumption. I have suggested therefore that they exclude purchases made by local quartermasters in local grain surplus areas. There appear to be no data on these local military purchases.

We will now consider in more detail the figures for the grain purchased by the 'Intendønstvo' during this period. As mentioned above, the traditional contracts system, using private middlemen operated with prices fixed and considerably higher than the market price. In conditions when the market price was rising the authorities were more or less satisfied with this system. But with the onset of the depression in agricultural prices the gap between the prices paid by the 'Intendanstvo' and the market price widened[1] and the authorities became less satisfied with the expense of the system. In such circumstances an attempt was made to deal direct with large scale producers (mainly the gentry) and to cut out the expensive middlemen. However the Ministry of War appeared to lack the necessary flexibility for such operations and succeeded in collecting only a very small quantity of grain direct from the producers.

The situation appears to have become quite serious in the early 1890s at the time of the famine. In conditions of general shortage the 'Intendanstvo' was unable to collect as much grain as it required. The level of collected grain fell from 0.32 mln.tons in 1889 to 0.21

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1. For an indication of the fall in market prices of grain and the prices paid by the 'Intendanstvo', see N.A.Egiazarova, Agrarnyi krizis kontsa XIX veka v Rossii, M.1959, pp.175-77.

millions tons in 1891[1]. Whether this actually led to shortages in military rations is uncertain, but there must certainly have been a major drain on the size of military stocks. For three years in a row 1890-92 significantly less than 0.3 mln.tons of grain was collected.

Following this experience Witte proposed that the Ministry of Finance be allowed to undertake direct grain purchases for the army in order to build up stocks , and to help the producers overcome the harmful effect of the famine[2]. Witte proposed that the Ministry of Finance should organise these collections through the agencies of the Gubernia or Uezd Zemstvo Authorities, the agricultural societies and associations and also through the commercial agents of the railways. And despite the hindrance from the War Ministry such locally organised direct collections did succeed in collecting more than 0.14 mln tons of grain in their first year of operation and thereby helped bring the total level of grain collected up to 0.35 mln.tons.

Although the Ministry of Finance continued to organise some of these military supplies in later years it did not maintain its importance. Having been shown how to organise local collections through the local zemstvo agencies, the War Ministry soon adopted this system itself and began collecting a larger share of its grain in this manner.

Following the disaster of the Russo-Japanese War, and the decision to increase the size of the army, a further review of state procurements policy was required. Great attention was again paid to the expense of the contracts system[3], but V.N.Kokovtsov the Finance Minister was reluctant

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1. See table following.
2. See T.M.Khitanina, ibid., L.1978, pp.201-207
3. See T.M.Khitanina, ibid., L.1978, p.260.

Grain collected for the army in mln.tons

	Ministry of War			Min.Fin.		All	All
	Contracts	direct	all	direct	All	contracts	direct
1889	0.315	0.006	0.321	-	0.321	0.315	0.006
1890	0.255	0.006	0.261	-	0.261	0.255	0.006
1891	0.211	0.001	0.212	-	0.212	0.211	0.001
1892	0.281	0.002	0.283	-	0.283	0.281	0.002
1893	0.338	0.005	0.343	-	0.343	0.338	0.005
1894	0.205	0.002	0.207	0.146	0.353	0.205	0.148
1895	0.254	-	0.254	0.105	0.359	0.254	0.105
1896	0.288	-	0.288	0.059	0.347	0.288	0.059
1897	0.301	0.013	0.314	0.062	0.376	0.301	0.075
1898		0.013		0.039			0.052
1899		0.074		0.038			0.112
1900		0.154		0.034			0.188
1901		0.116		0.035			0.151
1902		0.189		0.034			0.223
1903							
1904		0.165		0.042			0.207

Source: T.M.Khatanina, Khlebnaya Torgovlya Rossii v 1875-1914gg pp.708-709,

to expand the involvement of his Ministry. A special interdepartmental commission under the chairmanship of the principle 'intendant' considered this question in June 1908 and having decided that the solution must lie in greater zemstvo involvement in organising local collections, it referred the question to the next zemstvo gathering which took place in December 1909.

It was ultimately agreed that the separate gubernia zemstva would take on the job of breaking down the orders for grain and distributing them between the different uezd zemstvo authorities and that the latter would distribute the orders between the different producers. This system was carried out on a trial basis initially in 1909/10 in Simbirskaya, Penzenskaya and Kazanskaya Gubernii, where it appears to have worked with great success[1]. In the following years a few other zemstvo authorities agreed to be involved in distributing procurement orders. But right up until the outbreak of war the contracts system appears to have remained the source of most of the procured grain.

Our knowledge of war-time military procurements is much more complete than that for the pre-war period. Kondratiev has analysed this question in great detail and TsSU has also reworked these materials[2].

For a detailed account of the organisation of state procurements during the War the reader is referred to Kondratiev's work and the work of Zaitsev and Dolinsky, which is mainly based upon Kondratiev's work[3]

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1. See T.M.Khtanina, ibid., L.1978, p.263.
2. See N.D.Kondratiev, Rynok khlebov i ego regulirovaniye vo vremya voiny i revolutsii, M.1922. TsSU devoted a whole volume of its Trudy Tom XIII to the army during the War. Many authorities including P.I.Popov cite from it, but the official TsSU bibliography states that volume XIII of the Trudy was never published. (See E.A.Mashikhin and V.M.Simchera, Statisticheskiye publikatsii v SSSR M.1975, p.66).
3. N.D.Kondratiev, ibid., M.1922, K.I.Zaitsev and N.V.Dolinsky, 'Organisation and Policy', in P.V.Struve (ed.) Food supply in Russia during the World War, Yale 1930.

Here I will just give a very brief outline of the organisation and how it changed.

Popov provides us with the following data on the foodstuffs consumed by the army during the 1914/18 War:

Year	flour	groats	Oats Barley	All in grain equivalent
1914	0.39	0.06	0.86	1.34
1915	1.94	0.25	2.52	4.87
1916	3.47	0.57	4.83	9.23
1917	3.65	0.49	2.87	7.37

Source: P.I.Popov, in Sel.Khoz. na putyakh vosstanovleniya, M.1925 p.28. Popov is citing 'Rossiya v mirovoi voiny' 1914-1918g., Trudy TsSU, Tom.XIII, p.60. (This is the volume which Mashikhin & Simchera tell us was never published, see above p.162).

It will be readily seen that fodder crops account for 64% of all military consumption in 1914, 52% in 1915, 52% in 1916, but only 39% in 1917.

If we were to apply the standard January 1916 rations to these data we would see that they were sufficient to feed the following numbers of soldiers and horses, in millions:

Year	No.of soldiers from flour data	No.of soldiers from groats data	No.of horses from Oats & Barley data	Proportion of soldiers to horses according to flour data	Proportion of soldiers to horses according to groats data
1914	1.39	1.62	0.42	3.3	3.9
1915	6.90	6.76	1.23	5.6	5.5
1916	13.35	15.41	2.35	5.7	6.6
1917	12.99	13.2	1.40	9.3	9.4

If we compare these data with the above estimates of number of soldiers in the army at given times we see that 1914 must have been the

year of greatest food supply strain.

Given my earlier estimates of the size of the army at different periods, these present estimates would indicate that for most years with the exception of 1914 the amount of food grains available were ample for the number of soldiers requiring to be fed:

	Number of soldiers estimated in millions		
Year	from recruitment and loss data	from flour data	from groats data
1914	2.00	1.39	1.62
1915	7.00	6.90	6.76
1916	10.00	13.35	15.41
1917	9.00	12.99	13.20

However this assumption might be somewhat rash. It seems to me to have been quite likely that there was some substitution amongst the grains. It is quite likely that large quantities of barley were collected in 1914 primarily because of the unanticipated decline in barley exports. It would consequently have been relatively easy to collect barley in 1914, and the quantity of barley collected may well have been more than was required by the livestock, and so may well have been given to the soldiers. In later years when it became harder to collect fodder grains, it is quite likely that substantial quantities of rye and groats were fed to the horses.

One of the main problems with the above data is that they are grouped according to calendar year and not according to agricultural year. No data are available for total military utilisation divided by crop year, but Kondratiev does provide us with a detailed account of monthly figures of grain transported to the army by the centralised transporation system. These figures clearly do not include all military consumption but they do cover a large proportion of it, and enable us to see the seasonal incidence of the flow, and make the division between agricultural years.

f) Changes in quantities of grain held in stocks

Grain was produced once a year but it was generally consumed throughout the year and in some cases in the following years. Stocks were held by the producer, by the agencies involved in transferring the grain from the producer to the consumer, and by the consumer. There were long term reserve stocks which aimed at balancing out the great annual variability in production from year to year, and there were seasonal stocks which aimed at ensuring adequate supplies of grain until the appearance of the next year's harvest.

Little data are available on peasant producer stocks. The size of peasant stocks naturally featured in the peasant budget studies which were carried out. But there were no attempts to aggregate the results from all these various studies and an analysis of stocks was not included in Chayanov's survey. In his survey of pre-war grain forage balances P.I.Popov states that as a general rule the peasantry would aim at setting aside enough grain to satisfy their own utilisation needs for 15 months after the harvest[1] i.e. that apart from keeping the seasonal stock of his full requirements for the year, the peasant would aim at a reserve stock of 25% of these basic requirements. This assumption was presumably based on Popov's own experience in peasant budgets in Tula G. or on some other work.

The level of stocks held by private producers, and traders was collected by the Department of Taxation (okladnyikh sborov) once a year on 1 July. P.I.Lyashchenko notes[2] that there are several problems involved in using these data. First, since these data were known to

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1. P.I.Popov ibid., M.1924, pp. 19
2. See P.I.Lyashchenko, Ocherki agrarnoi evolutsii Rossii, Vol.1, M.1923 p.194.

be collected for taxation purposes and since they were based for the most part on unchecked and unchekable questionnaires, they can be expected to involve a considerable amount of concealment. Lyashchenko does admit that the taxation data for the larger trading establishments may be fairly reliable because the taxation officials did carry out periodic investigations of these larger traders. But most of the smaller traders and the private producers could rest assured that the taxation department just could not afford to investigate them. A second and even more serious problem, however, lay in the timing of the Department's investigation and the fact that it only occurred once a year. Lyashchenko points out that the Russian agricultural year was very irregular and that sometimes, depending upon agro-meteorological conditions, there would be quite considerable delays in the time of harvesting. In such delayed years the grain from the new harvest may not find its way into the stores of the traders and private producers until well after July 1 and probably after August 1. In anticipation of the delayed harvest the traders and producers would maintain their stocks relatively high until the new harvest appeared. A high level of stocks on July 1 may not therefore simply indicate a high level of carry-over from one year to another, but might indicate a slow-down in the discharge of stocks in anticipation that there was going to be a further lengthy period before stocks could be replenished. The true level of carry-over would then be indicated by the low point in stocks held, which would come later.

P.I.Lyashchenko therefore recommended that some official agency, TsSK or the Department of Taxation, should carry out a series of periodic sample survey investigations, clearly advertising that they were not for taxation purposes, and that these should be used as a supplement to the more mass data to get a better picture of the stocks situation. Such a survey was in fact carried out on a semi-official basis by the journal

Vestnik Finansov. The journal received monthly reports from the managers of elevator and railway warehouses, from local stock exchange committees and from a network of other private correspondents. The Vestnik Finansov data had been collected since 1897, and soon covered 27 major markets, 5 main railway lines and most of the best equipped grain elevators[1]. This was about 5% of the coverage of the Tax Department data. Compilations of these figures, given separately for each grain with little aggregation, are very bulky and so have not been included in this thesis.

The Tax Department data for the four main grains in the 64 gubernii of European Russia and the North Caucasus are given in the following table for the years from 1897-1910[2]:

Tax Department data on the stocks of grain held by major producers, traders, shops, and held in transit in mln.tons in 64 gubernii of European Russia and North Caucasus.

	Rye	Wheat	Barley	Oats	All four main grains
15/7/1897	5.92	2.53	0.31	0.95	9.71
98	3.54	1.55	0.42	0.57	6.08
99	2.97	2.53	0.54	0.59	6.64
1900	3.94	2.16	0.44	0.87	7.41
01	4.34	2.12	0.44	0.79	7.69
02	2.75	1.59	0.32	0.44	5.09
03	3.05	1.96	0.46	0.67	6.14
04	2.95	2.24	0.62	0.55	6.36
05	3.70	2.54	0.52	1.10	7.85
06	2.53	2.25	0.42	0.82	6.02
07	1.40	1.42	0.28	0.38	3.47
08	1.46	1.28	0.30	0.39	3.43
09	1.53	1.33	0.33	0.40	3.59
1910	2.57	2.30	0.57	0.83	6.27

Source: Spravochnik po khlebnoi torgovlye, SPb,1911,p.100

1. See P.I.Lyashchenko, ibid., M.1923,p.195. The 27 major markets were: Saint Petersburg,Revel,Riga,Libav,Warsaw,Voronezh,Kiev,Yelyets,Lyivan, Moscow,Ryibinsk,N.Novgorod,Kazan,Chistopol,Verkhnyedeprovsk,Saratov, Tsaritsyn,Orenburg,Taganrog,Genichek,Novorossiisk,Rostov on Don,Mariupol, Berdyansk,Feodosiya,Odessa and Nikolaev. The railway elevators on the five main railway lines were on the: Kharkov/Nikolaevsk,Ryazan/Ural, South Western, Moscow/Kazan and Syirzan/Yazemskii railway lines.

2. The data supplied by P.I.Lyashchenko, in P.I.Lyashchenko ibid.,M.1923 p.204, from unpublished Taxation Department data covered just 63 gubernii and the years 1896-1910. These data covering 64 gubernii were some from Spravochnik po khlebnoi torgovlye,SPb. 1911, p.100.

These figures indicate fairly substantial changes in stock levels.

During the War the 1916 agricultural census provided the first census of grain stocks. This census was taken in July 1916 and provided the following data:

Grain stocks held on July 15, 1916

	Pomeshchiki	Peasants	Traders	Social grain stores	In Transit	All
Non chernozem (21 Gub.)	0.05	0.41	0.49	0.21	0.17	1.31
SCR (9 Gub.)	-	0.04	0.05	0.02	-	0.11
Chernozem & N.Caucasus (29 Gub.)	0.54	1.54	1.20	0.67	0.62	4.38
Siberia & Steppe (6 Gub.)	0.06	0.31	0.27	0.14	0.01	0.79
All (65 Gub.)	0.65	2.30	2.00	1.03	0.60	6.59

Source: A.M.Anfimov, Rossiiskaya derevnya v gody pervoi mirovoi voiny, M.1962, p.309, citing from the archives TsGIAL F 23, op.9, d 970.

These figures would indicate that the producers had 2.95 million tons of grain left before the 1916 harvest. This was less than 5% of the harvest and must have been significantly less than the three months of stocks claimed to be normal by Popov. But we should be careful in accepting the absolute reliability of these data.

g) Data on grain exports

Relatively reliable and detailed records were kept by the Department of Customs and Excise (Glavnoye upravleniye tamozhennyikh sborov) of the quantities of grain exported. These statistics date back to long before regular and reliable indicators of grain production are available. The following table presents an indication of the size of grain exports according to type of grain for over two centuries before the First World War: see table over page.

Pre-revolutionary grain exports from Russian Empire less Finland and Poland

Average Annual Exports in mln.tons

	Rye	Wheat	Barley	Oats	Total of 4 grains	All grains
1701-1761	0.0033	0.0003	0.0001	-	0.0037	
1762-1770	0.0076	0.004	0.0002	0.0005	0.0124	
1771-1780	0.0227	0.0119	0.0006	0.0004	0.0356	
1781-1790	0.0147	0.0077	0.0013	0.001	0.0248	
1791-1801	0.0119	0.0271	0.0023	0.0016	0.0429	
1801-1805	0.0763	0.1277	0.003	0.0028	0.2098	
1806-1810					0.224	
1811-1815					0.086	
1816-1820	0.1354	0.2845	0.028	0.0381	0.486	
1821-1825	0.012	0.138	0.012	0.0033	0.165	
1826-1830	0.105	0.222	0.0212	0.037	0.38	
1831-1835	0.09	0.176	0.017	0.018	0.303	
1836-1840	0.08	0.4248	0.027	0.025	0.473	
1841-1845	0.06	0.3521	0.022	0.015	0.446	
1846-1850	0.17	0.5744	0.03	0.057	0.835	
1851-1855	0.15	0.521	0.032	0.044	0.745	
1856-1860	0.24	0.6246	0.098	0.128	1.094	
1861-1865	0.23	0.8212	0.082	0.098	1.227	
1866-1870	0.34	1.257	0.124	0.249	1.97	
1871-1875	0.87	1.509	0.197	0.392	2.97	
1876-1880	1.36	1.81	0.338	0.699	4.21	
1881-1885	1.00	2.04	0.53	0.84	4.41	
1886-1890	1.35	2.67	1.01	1.00	6.03	
1891-1895	0.93	2.93	1.52	0.93	6.18	
1896-1900	1.22	2.73	1.42	0.72	6.12	
1901-1905	1.27	3.78	2.02	1.26	8.33	9.97
1906-1910	0.69	3.74	2.97	0.93	8.33	10.08
1911-1913	0.66	4.24	3.72	1.09	9.71	11.92
1913	0.65	3.33	3.93	0.6	8.51	10.66

Source: 1701-1805, B.N.Mironov in Istoricheskiye zapiski , no.93,M.1974 pp.168-69; 1816-1900 P.I.Lyashchenko in Polnoe entsiklopediya Russkogo selskogo Khozyaistva, Tom IX, vyp 1-2 SPb 1904,pp.1227-29. 1806-1815 computed from Den, Kurs ekon.geografii , M.1925, p.184, Mironov and Lyashchenko, ibid.
1901-1913 P.I.Lyashchenko, Russkoe zernovoye khozyaistvo,M.1927,p.311

It can be seen that until the beginning of the nineteenth century gross exports were less than 50,000 tons per year. In the second half of the second decade of the nineteenth century, in response to the last great famine to affect Western Europe, Russian grain exports rose to almost half a million tons. For the next quarter of a century Russian exports fell well below this level. After the repeal of the corn laws and the opening up of the British market in 1847 Russian grain exports began to grow rapidly. By 1860 they had exceeded a million tons per year, by the 1870s they were well over 2 million tons per year and by the 1860s well over 4 million tons per year. The railways and steamships then added a further boost to the level of grain exports which rose to well over 6 million tons in the 1890s, over 8 million tons in the first decade of the twentieth century and over 10 million tons on the eve of the war. This was a very large proportion of the total crop. From 1880-1913 the volume of exports fluctuated between 10% and 26% of the total harvest[1]. For barley and wheat the proportion was much higher. In the eighteenth century rye was the major export crop. From the beginning of the nineteenth century rye exports were exceeded by wheat exports and on the eve of the First World War there had been a great increase in barley exports (barley exports actually exceeded wheat exports in 1913).

The shift in importance from rye exports to wheat and barley exports was also associated with a shift of agricultural production to the south and the opening up of the southern ports. If in the second half of the eighteenth century 73% of the grain was exported through the northern ports, by

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1. Only in 1892, the year of the famine did it drop to below 10% and then only to 9%.

the late 1870s this proportion had fallen to 63%, by the late 1880s to 40%, by the end of the century to 36% and on the eve of War to as low as 30%[1].

Most of these figures are presented in the form of calendar years. When we are dealing with periods of ten or even five years average length the use of calendar year data presents us with only a small margin of error, but when we are concerned with annual data we must be far more careful. A series of data covering exports for the agricultural year (October 1 - September 30) is presented in the table on following page.

These data may compared with a more lengthy series of annual data in calendar year periods, supplied by Popov:

Pre-revolutionary grain exports from Russian Empire less Finland and Poland in mln.tons

1880	3.29	1890	6.85	1900	6.88	1910	13.9
81	3.41	91	6.41	01	7.64	11	13.5
82	4.94	92	3.22	02	11.13	12	9.04
83	5.63	93	6.62	03	10.68	13	10.66
84	5.26	94	10.48	04	10.63	14	6.18
1885	5.63	1895	9.41	1905	11.43	15	0.00064
86	4.71	96	8.3	06	9.68	16	0.00069
87	6.44	97	8.01	07	7.71	17	0.00005
88	8.97	98	7.52	08	6.63		
89	7.64	99	5.66	09	12.48		

Source: P.I.Popov 'Khlebofurazh balans...' in Selskoye khozyaistvo na putyakh vosstanovleniya, Tom 1, M.1925, p.35.

The fluctuations in the agricultural year data are much more pronounced than in the calendar year data. The latter suffer the dampening effect

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1. See V.N.Mironov, Istor.Zapiski, no.93, M.1974, p.168 P.I.Lyashchenko, Istoriya razvitiya narodnogo khozyaistva SSSR, T.II, M.195, pp.227-8. N.D.Kondratiev 'Rynok khlebov i ego regulirovanie vo vremya voini i revolutsii' M.1922, p.24. Note this is just considering the exports by sea from the Arctic, Baltic and Black Sea. In 1910 Kondratiev also draws attention to grain exports overland to the west, which at this time accounted for 11.5% of all grain exports. (See N.D.Kondratiev, ibid., p.24).

Grain Exports in mln.tons, by agricultural year (1 Oct. - 30 Sept.)

	Wheat	Rye	Oats	Barley	others	All grains	4 main grains
1895/96						8.11	
1896/97						7.99	
1897/98						8.25	
1898/99						5.88	
1899/1900						6.50	
1900/01	2.16	1.40	1.33	1.09	1.24	7.22	5.98
1901/02	2.51	1.37	0.91	1.48	2.10	8.37	6.27
1902/03	3.86	1.65	1.32	2.23	1.80	10.86	9.06
1903/04	4.19	1.14	0.48	2.48	1.63	9.92	8.29
1904/05	5.25	0.87	2.05	2.40	1.48	12.05	10.57
1905/06	4.14	0.98	1.48	2.33	1.28	10.20	8.92
1906/07	2.65	0.91	0.43	2.17	1.56	7.71	6.15
1907/08	1.54	0.66	0.41	2.44	1.62	6.67	5.05
1908/09	3.14	0.41	0.90	3.41	1.74	9.61	7.87
1909/10	6.47	0.59	1.36	3.77	1.77	13.96	12.19
1910/11	5.69	1.11	1.57	0.45	2.64	15.50	12.86
1911/12	2.26	0.38	0.78	2.85	2.46	8.73	6.27
1912/13						9.76	
1913/14							
1914/15							

Sources: 1895/6 - 1911/12 all grains from Sel.khoz.promysel v Rossii, P.1914, p.126.

1900/1 - 1911/2 by grain from Sbornik statistiko-ekonomicheskikh svedenii po sel.khoz.Rossii i inostrannyikh gosudarstvo SPb.1914, p.336

Data from the Department of Customs and Excise (Tamozhennyikh sborov)

of including the effect of two years' harvests.

Lyashchenko provides us with the following indication of the seasonal pattern of grain transfers to the ports: see table below

1897-1904 Seasonal transfer of Wheat, Rye, and Oats to the ports for export

	in mln.tons	in %
January	0.19	5.6%
February	0.17	5.0%
March	0.19	5.6%
April	0.27	7.9%
May	0.29	8.5%
June	0.18	5.3%
July	0.16	4.7%
August	0.38	11.1%
September	0.47	13.8%
October	0.46	13.5%
November	0.32	9.4%
December	0.33	9.7%
	3.41	100.0%

Source: P.I.Lyashchenko, Ocherki agrarnoi evolutsii Rossii, Tom 1, M.1923, p. 291

It can readily be seen that the months from August to December, immediately after the harvest were the times of maximum transfers of grain to the ports. But this does not mean that the grain was actually exported in these months or that the exports of these months were sufficient to ensure that the calendar year in which the harvest took place was the one most affected by the size of the crop.

I have carried out a few simple correlations between the production data for 1900-1911 and the exports for a) immediately following the harvest(October - September) the agricultural year, b) the calendar year in which the harvest took place and c) of the calendar year following

the harvest. The correlation coefficients for each of these cases were:

a) R^2 = 0.783

b) R^2 = 0.278

c) R^2 = 0.442

These results emphasise the importance of dealing with the export data in agricultural year periods, and failing this the data for the calendar year following the year in which the harvest took place are preferable to the calendar year in which the harvest took place.

h) Losses

The importance of the losses item depends largely upon the definition of grain production utilisation used . For a biological yield the losses item would clearly include harvesting losses and losses involved in the transportation to the barn. Even if we were dealing with the barn yield, unless a specific account of the 'condition' of the grain were made at the time of harvest 'losses' could occur simply because of the subsequent drying-out or cleaning of the grain. Apart from the above mentioned losses, losses could occur during storage and during trans-shipment due to spoilage and wastage. Depending upon how it was calculated losses could occur in milling, although generally the bran and other residuals should have been kept and fed to the animals as millfeed. And finally we have to consider losses in utilisation. Not all grain presented as food, or feed, was consumed. In a peasant household stale bread might be fed to the animals, but in other cases it might just be thrown out.

Generally, in the grain forage balances which are being presented in this paper, losses will refer to losses in storage and transportation and not to the other possible kinds of loss. In most cases this loss is set as an arbitrary percentage. Some reference may be made to a residual, but the accuracy of the balance and the nebulous quality of many of the elements in it give this little justification.

i) Transportation data

Pre-revolutionary statistics on grain transportation were collected by two central organs: the department of railways of the Ministry of Finance and the statistical department of the Ministry of Communications. The former agency was mainly concerned with overseeing overall organisation of transportation.

Both agencies relied upon the basic data supplied in the annual and monthly reports of the railway operators and of the different port authorities for waterway and maritime transportation[1].

Although there is an abundance of pre-revolutionary grain transportation statistics I have not attempted to recompute all these basic data into my comparable regions. This would be a major task, which cannot be undertaken at the moment. I have therefore restricted myself to providing a few indications of the overall patterns of grain transportation and have only presented more detailed regional figures where they are fairly readily available from secondary sources.

Traditionally in Russia, it was the rivers that were the main arteries for grain transportation. The major river was the Volga which linked the agricultural regions of the Volga, Samara G., Saratov G., Penza G., Simbirsk G., with the northern industrial regions, with transhipments at Nizhegorod for Moscow or at Rybinsk for St.Petersburg via the Mariinskii canal. The Dnepr and the Don in the south were already supplying some grain to the Black Sea ports but their great period lay ahead with the development of the railways.

The following table presents an indication of the magnitude of grain transported on the river system for several years, spanning the period from the 1880s to the beginning of the twentieth century:

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1. See Istoriya Sovetskoi Gosudarstvennoi Statistiki, M.1960, p.153

Grain transported by rivers in Russia in million tons.

	Volga	Dnepr	Don	Other	All
1837/38	1.29	0.02	0.05	0.26	1.62
1844-54	0.81				
1854	1.46	0.17	0.07	0.41	2.11
1859-62	1.16	0.07	0.10	0.25	1.58
1863	0.98				1.85
1895	1.89	0.96	0.33	0.55	3.73
1896	2.13	0.71	0.34	0.49	3.67
1897	2.29	0.66	0.43	0.43	3.81
1898	2.31	0.68	0.43	0.43	3.85
1899	1.43	0.57	0.42	0.27	2.69
1900	2.46	0.40	0.49	0.32	3.67
1901	2.87	0.46	0.37	0.55	4.25
1902	1.98	0.74	0.39	0.54	3.65
1903	2.37	1.19	0.55	0.64	4.75
1904	2.93	1.18	0.64	0.47	5.22
1905	3.83	1.07	6.65	0.45	6.00
1906	2.81	0.76	0.28	0.76	4.61
1907	1.85	0.81	0.27	0.43	3.36
1908	2.04	0.66	0.37	0.42	3.49

Sources: 1837/38, 1854, 1859-62. I.D.Kovalchenko, Russkoye krepostnoye krestyanstvo... M.1967, p.94.
1844/54, 1863. I.Vilson, Obyasneniya k khoz.stat.atlasu Evropyeiskoi Rossii, SPb 1869, p.171.
1895-1908 P.I.Lyashchenko, Khlebnaya torgovlya na vnutrenniykh rynkakh Evropyeiskoi Rossii, SPb 1912, p.19.

The amount of grain recorded as transported on the Volga had risen from a level of 0.8 - 1,5 million tons a year in the first half of the nineteenth century to a figure averaging 2.4 million tons a year, at the end of the century. The Dnepr and the Don had risen somewhat in importance but still only transported an average of a million tons between them a year.

This relatively low development was of course because of the emergence of an alternative means of transportation - the railways. The first railway of any economic significance was the Nikolaevskii railway connecting the regions of the Central Chernozem region with Moscow and then on to St.Petersburg. The first grain began arriving by rail in Moscow in 1860, by the end of that decade both Moscow and St.Petersburg were annually receiving 0.3 million tons of grain by rail a year. By the turn of the century Moscow was receiving from 0.5 to 0.7 million tons of grain a year by rail and the Moscow Industrial region was receiving over 1 million tons[1].

Grain transported by rail in mln.tons:

	haulage for export	internal haulage	all	in % haulage for export	internal haulage in %
1876-80	2.64	1.97	4.61	57.3%	42.7%
1881-85	3.20	2.82	6.01	53.2%	46.8%
1886-90	3.86	3.05	6.91	55.9%	44.1%
1891-95	3.59	4.21	7.80	46.0%	54.0%
1896-1900	5.21	4.86	10.07	51.7%	48.3%
1901-05	6.83	5.37	12.20	56.0%	44.0%
1906-10	7.58	7.12	14.70	51.6%	48.4%
1911-13	6.76	7.03	13.79	49.0%	51.0%
1895	6.14	3.60	9.74		
1896	6.12	3.70	9.82		
1897	4.81	3.50	8.31		
1898	5.08	4.31	9.39		
1899	4.53	4.67	9.20		
1900	5.51	4.86	10.37		
1901	5.54	4.90	10.44		
1902	7.27	5.16	12.43		
1903	7.22	5.90	13.12		
1904	6.00				
1905	7.28	5.52	12.80		
1906	6.88	7.00	13.88		
1907	5.68	7.47	13.15		
1908	5.17	7.23	12.40		
1909	10.16	7.03	17.19		

Sources: 1876-80/1911-13
P.I.Lyashchenko in Entsiklopediya Russkogo eksporta, Tom 1, Berlin 1924, p.112.

1895-1909
P.I.Lyashchenko, Khlebnaya torgovlya na vnutrennyikh rynkakh Evropyeiskoi Rossii, SPb.1912, p.11.

1. See P.I.Lyashchenko, Ocherki agrarnoi evolutsii Rossii, Vol.1, M.1923 pp.231-2

The following figures indicate the remarkably rapid growth in rail transportation of grain. Already in the 1870s more grain was being transported by rail than by waterways. And whereas the amount transported by rail more than tripled before the war, the amount transported by waterways remained fairly steady once the railways had been built.

These figures also indicate the very large proportion of transported grain that was being transported for export. During this period the whole nature of the grain export business was greatly changed and expanded, whereas before the 1870s the northern ports had dominated the export market by the 1890s the railways had turned the south into the major export region.

Grain transported to ports in mln.tons

	Northern Ports	Southern Ports	Overland route	German Ports	All
1876	1.2	0.5	0.5		
1878	1.8	1.4	0.8		
1880	1.2	0.4	0.2		
1895-99	1.9	2.5	0.5	0.4	5.3
1900-05	2.1	3.3	0.6	0.5	6.5
1906-10	1.9	4.5	0.5	0.6	7.5

Source: cited from T.M.Khitanina, Khlebnaya torgovlya Rossii v 1875-1914gg L.1978, pp.55,56 citing A.D.Bilimovich Tovarnoe dvizheniye na russkikh zheleznyikh dorogakh, Kiev, 1902, p.71 and Materialy k peresmotru torgovogo dogavora s Germaniyei, SPb.1914, vyp.II, p.55.

More detailed regional transportation data have only been reworked into regional groups for a few odd years.

Data from the 1896 Tariff Congress provide us with the following picture of the 1895 internal grain rail transport balance; in million tons:

	Receipts	Despatch	Net Despatch
NCR	1.69	0.19	-1.50
SPR	0.15	0.69	+0.54
CPR	0.31	1.55	+1.24
excluded regions (Baltic, Poland)	0.29	0.01	0.28
All	2.44	2.44	

Source: P.I.Lyashchenko, Ocherki..., M.1923, p.231

Note: This balance excludes exported grain

Two balances for 1901 and 1913, which were constructed by I.Poplavsky, the head of the department of transport statistics in TsSU, in the 1920s allow us to see the changes in the balance over a longer period. There are of course problems involved in accepting these years as being in any way typical, 1912 and 1913 were particularly good harvest years while 1900 and 1901 were rather poor. But nevertheless they do provide an indication of developments. The balance item indicates the scale of net despatches from the given region (i.e. despatches-receipts):

Grain transport balances net despatches in mln.tons

	including foreign trade		excluding foreign trade		foreign trade	
	1901	1913	1901	1913	1901	1913
NCR	-2.85	-4.33	-2.98	-4.82	+0.13	+0.69
SCR	+0.18	+1.33	-0.47	+0.35	+0.65	+0.98
SPR	+4.63	+8.25	+2.13	+1.36	+2.50	+6.89
CPR	+2.31	+1.49	+2.31	+1.49	0	0
EPR	+0.20	+0.76	+0.20	+0.90	0	-0.14
All USSR	+4.48	+9.30	+1.18	+1.08	+3.30	+8.22

Source: Trudy TsSU, Tom XIX, vyp.II, M.1925, pp.6-11

From these figures we see the increase in scale of net receipts of grain by the NCR, rising from 1.5 million tons in 1896 to 2.9 million tons in 1901 and 4.3 million tons in 1913[1]. Most of this amount came from the

1. I have deducted the 0.1 and 0.5 million tons that were re-exported in 1901 and 1913.

CPR, but almost an equal amount came from the SPR in 1901 and 1913, and almost 0.9 million tons came from the EPR. Most of the exports came from the SPR at this time as was to be expected. Almost 1 million tons were exported from the SCR in 1913, but this seems to have been exceptional. The SCR exported grain also in 1901 but this left it with a need to import grain for its own consumption needs.

Apart from these balances we also have a most detailed grain transportation balance for 1909/13 that was constructed for the special food council, to assist in the task of planning food supply in 1916.

This balance was calculated for the separate grains in the separate regions. Unfortunately, a regional breakdown was not given for all the elements of all the grains and it is therefore best to consider only the 4 main grains. These however do comprise the bulk of the transported grain. The results of this balance for the 4 main grains are given in the following table:

Net despatches of grains in 1909/13 in million tons

	Wheat grain	Wheat flour	Rye grain	Rye flour	Oats	Barley	4 main grains	Export abroad 4 main grains	internal transfer
1. NCR	-0.6	+0.7	-0.6	-0.9	-0.7	-0.1	-2.1	+0.6	-2.7
2. SCR									
3. SPR	+4.0	+2.0	+0.6	+0.1	+0.2	+3.7	+10.5	+7.8	+2.7
4. CPR	+0.9	+1.4	+0.3	+0.7	+1.5	0	+4.8	+0.1	+4.7
5. EPR	-0.1	+0.8	+0.4	+0.2	+0.3	0	+1.5	-0.3	+1.8
All USSR	+4.2	+4.9	+0.6	+0.1	+1.3	+3.6	+14.8	+8.2	+6.6

Source: See data cited in V.G.Groman, Khlebnaya produktsiya i khlebnyi eksport Rossii, in Entsiklopediya Russkogo eksporta, Tom 1, Berlin 1924, pp.162-73. The data initially came from Materialy k prodovolstvennomu planu. Proizvodstvo perevozki i potrebleniye khlebov v Rossii, Petrograd 1917, vyp.I. See appendix.

Again we see the SPR dominating the export market, while the CPR commands two-thirds of the internal transported grain. In both regions wheat is the largest single grain in the transport balance, over 60% of the total for 4 grains in the SPR and 48% in the CPR. In the former two-thirds of the wheat is exported in the unprocessed grain from which in the CPR over 60% is exported as flour. The CPR was the largest supplier of Rye and Oats both of which went to the internal market. The SPR as well as being by far the largest supplier of wheat was also the only supplier of barley. These were both major export grains.

Further figures characterising the regional rail grain balance are available for war years and are given below. These data are in different regionalisations not easily comparable with the earlier series of data. They are also very incomplete for 1916 and 1917. They indicate a further slight increase in grain transhipments into the NCR from 1913 to 1915 but a decrease in surpluses transported out of the CPR in these years.

	1913	1914	1915	1916
NCR	-2.62	-2.90	-2.91	-2.07* (-2.3)
SPR	+1.75	+1.39	+1.72	+2.21* (+0.8)
CPR	+2.76	+2.33	+1.81	+1.57
EPR	+0.33	+0.48	+0.16	+0.07
All	+2.21	+1.29	+0.78	+1.73

Source: Trudy TsSU Tom VI, vyp.2, M.1923, pp.169-76

Note: figures refer to internal transportation only

* refers to extremely unreliable data and figures in brackets are estimates for the balance when the missing values have been filled in by interpolation.

All these series of data indicate the growing specialisation of the regions and the increasing dependence of the NCR on grain imports.

4. Grain production, the available data

This chapter is divided into 6 sections. Sections a) to d) introduce the different series of grain production data covering different periods, and generally include a regional breakdown.

Section a) is designed to give an indication of the long-term perspective of changes in the level of grain production; Section b) reviews the available secondary series of detailed grain production data covering the nineteenth century. Section c) presents an indication of the annual dynamic of grain production in the 30 years before the First World War. Section d) presents the data on the level of wartime grain production.

The following two sections then consider other significant aspects of grain production - e) the production of the different grains and f) the different types of producer.

a) Strumilin's illustrative estimation of the dynamic of grain yields since the third century AD.

The most ambitious attempt to provide an indication of the dynamic of pre-revolutionary grain production was that given by the Soviet economist S.G.Strumilin in 1949[1]. This survey covered Russian 'grain' production from the third to the beginning of the twentieth century. Basing his account on the details of a few estates in the feudal and pre-feudal period, and upon the work of Mikhailovsky and the data of TsSK (both of which I will refer to later in this section) Strumilin provided the following 'illustrative estimation' (illustrativnyi raschet):

The Dynamic of Grain Yields in Russia

Social Stage and System of Agriculture	Main Implements	Date	Grain Production in tsentners per hectare		
			Gross	Seed & Feed	Net
1. Pre-feudal					
a) Slash & burn	Axe & wooden harrow	C3rd-4th until 17th	2.8 4.2	1.4 2.0	1.4 2.2
2. Feudal					
b) Three fields system	Sokha, Sickle & flail	C12th 1642 1850-60	4.2 4.5 4.9	2.0 1.9 1.9	2.2 2.5 3.0
3. Capitalist					
c) Multi field rotation system	Plough & horse machinery	1885-1889 1909-13	5.9 7.4	1.9 1.9	4.0 5.4

1. S.G.Strumilin in K istorii zemledelcheskogo truda, in Voprosi Ekonomiki, 1949, no.2, reproduced in S.G.Strumilin, Ocherki Ekonomicheskoi Istorii Rossii i SSSR, M.1966, p.186.

Of course it could be argued that there are few grounds for generalising the production pattern of the whole of Russia on the basis of a few estate reports. But on the other hand this is the evidence that medieval historians are normally forced back into relying upon[1]. Strumilin himself called this an illustrative indicator and it does indicate an order of magnitude which is believable.

b) Data from the Governor's annual accounts

i) The Fortunatov/Mikhailovsky yield data, 1800-1915

The longest series of pre-revolutionary data, based upon organised statistics covering a large national area are those from the provincial governors' accounts; these span the whole of the nineteenth century. A series of rye yields for the fifty provinces of European Russia from 1801-1891 had been published by A.F.Fortunatov in the early 1890s[2] and this series was updated by V.G.Mikhailovsky and published in the TsSU bulletin of 1921, as part of the work commissioned by TsSU at the time in connection with an analysis of the drought of 1921 and of harvest fluctuations in general[3].

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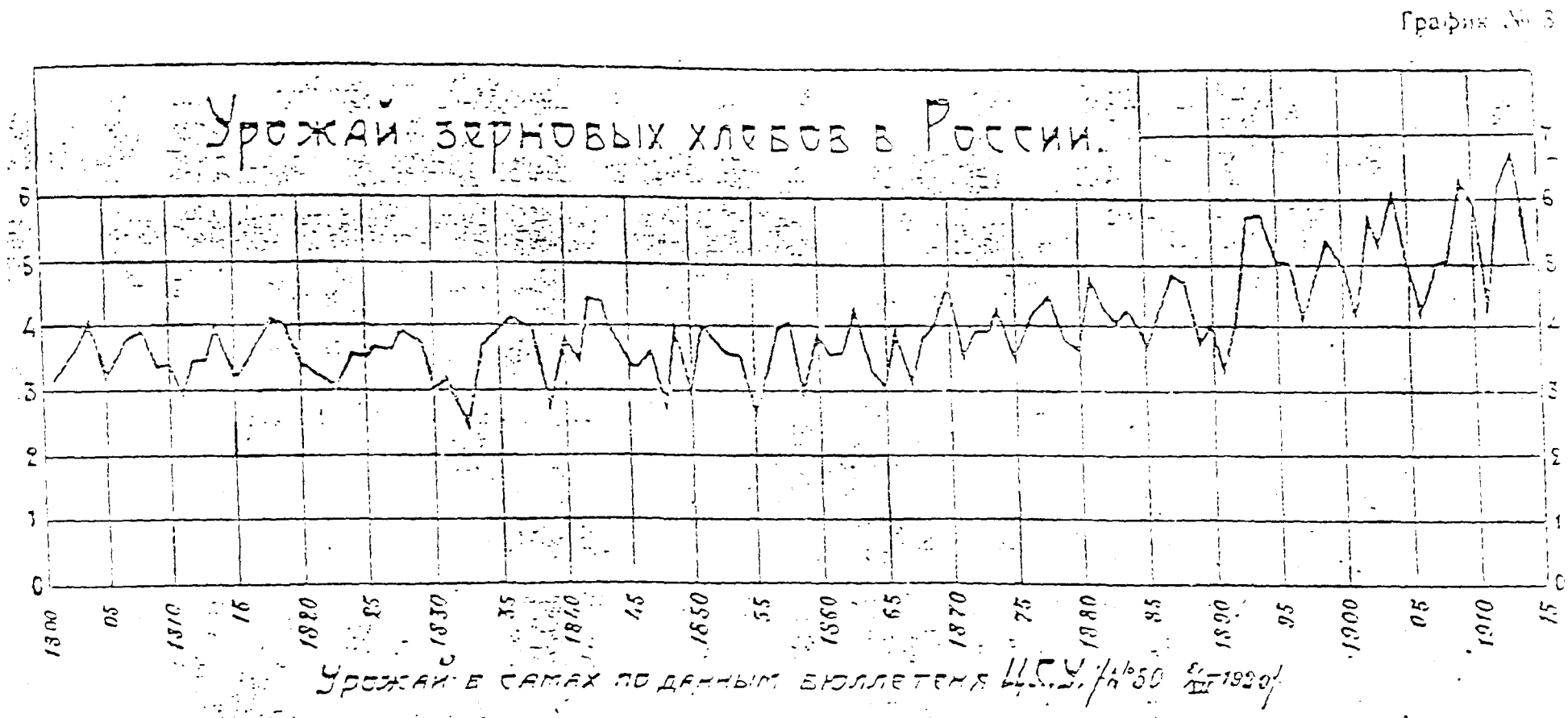
1. See B.H.Slicher Van Bath, The Agrarian History of Western Europe A.D. 500-1850, Edward Arnold, 1963, pp.170-80, see also R.E.F.Smith, Peasant farming in Muscovy, Cambridge 1977, pp.84-95.

2. A.F.Fortunatov, Urozhai rzhi v Evropeiskoi Rossii, M.1893

3. See Byulleten TsSU, 1921, no.50. There seems to be some uncertainty as to exactly what area and what crops were covered. Mikhailovsky's article was very short and the figures were always referred to as representing the yield of 'grain' in 'Russia'. The collegium of TsSU had requested Mikhailovsky to publish a longer and more detailed account of his work in their journal Vestnik Statistiki, but this was never completed. Having checked the sources, it seems to me that Mikhailovsky has combined Fortunatov's series for rye yields with a later series for all grains, which would give an upward distortion in the post 1890 period for the growth in rye yields. (See later) The figures as given by Mikhailovsky are also available in A.Chayanov (ed.) Problemy urozhai, M.1926, p.35.

The dynamic as presented by Mikhailovsky is given in the appendix and in the table below:

Yield of grain in Russia in Sam (units produced per unit of seed)



These data clearly indicate the great annual variability in grain yields and the long run trend. Until the 1850s the average yield remained about 3.5 per unit seed used. Thereafter it rose steadily to over 5.5 per unit seed used on the eve of the War.

ii) Kovalchenko grain production data 1800-1850

More recently Soviet historians have examined the same source of data and have presented a much more detailed series. In 1959 I.D. Kovalchenko published the results of his detailed reworking of the provincial governors' annual accounts of the state of agriculture at the beginning of the nineteenth century[1]. Kovalchenko analysed the production figures in 48 provinces of European Russia for three decades: 1802-11, 1842-50 and 1851-60. His results were grouped into 13 regions, but have been regrouped by me into only 4 major regions. Throughout this thesis an attempt will be made to cut the regional data down to a manageable size and to deal with roughly comparable major regions[2].

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1. See I.D.Kovalchenko, Dinamika urovnye zemledelcheskogo proizvodsvta Rossii v pervoi polovinye XIX v., in Istoriya SSSR, 1959, no.1 pp. Much of these data were subsequently reproduced in I.D. Kovalchenko, Russkoye Krepostnoe Krestyanstvo v pervoi polovinye XIX veka, M.1967.

2. See the special appendix on regions for a detailed account of the major regions used in this thesis and the methods by which other regional data have been converted into these regions. Basically we are dealing with five major regions: two consumer regions where grain has to be imported from other regions and three producer regions where grain was normally in surplus. The two consumer regions are: 1) the Northern Consumer Region (NCR) consisting of the northern, north westerly, and western gubernii as well as the Central Industrial Region and Belorussia; 2) the Southern Consumer Region (SCR) consisting of Transcaucasia and Turkestan (Central Asia). The three producer regions are: 3) The Southern Producer Region (SPR) consisting of the Ukraine and North Caucasus, 4) The Central Producer Region (CPR) consisting of the central agricultural region (Central Chernozem) and the Volga regions, and finally 5) the Eastern Producer Region (EPR) consisting of the Urals, Siberia, the Steppe region (Kazakhstan) and the maritime region (Far Eastern Region). Of these regions the SCR, the North Caucasus and all the EPR apart from some of the Urals are not included in the 50 gubernii of European Russia.

The dynamic of grain production in the different regions of European Russia in the beginning of the nineteenth century, according to Kovalchenko's data are given in the table below:

	NCR	SPR	CPR	EPR	USSR
1802/11					
Production	57.23	29.53	59.16	8.94	154.85
Sowings	19.42	7.90	16.71	3.00	47.04
Yield	2.95	3.74	3.54	2.98	3.29
1841/50					
Production	56.19	34.22	76.48	21.12	188.01
Sowings	20.16	9.21	22.32	6.06	57.76
Yield	2.79	3.71	3.43	3.48	3.26
1851/60					
Production	54.81	36.13	79.12	23.81	193.87
Sowings	20.59	10.14	23.79	6.92	61.44
Yields	2.66	3.56	3.33	3.44	3.16

Source: I.D.Kovalchenko, see appendix

Notes: Production and sowings are given in mln.chetvert and yield in 'sam'.

In order to make these data a little more meaningful I have converted the production data into million tons and have also calculated the level of per capita production:

Production in mln.tons.	NCR	SPR	CPR	EPR	USSR
1802/11	7.21	3.72	7.46	1.13	19.51
1841/50	7.08	4.31	9.64	2.66	23.69
1851/60	6.91	4.55	9.97	3.00	24.43
Per capita production in mln.tons					
1802/11	0.503	0.430	0.668	0.379	0.525
1841/50	0.414	0.370	0.632	0.530	0.483
1851/60	0.408	0.374	0.614	0.525	0.479

Source: I.D.Kovalchenko, see appendix.

Note: per capita figures refer to per capita of the rural population.

These figures indicate the very unfavourable manner in which Russian agriculture was developing during the first half of the nineteenth century. Kovalchenko's data indicate that there was a decline in yields in all regions apart from the relatively minor EPR. The 25% rise in production over this period was consequently totally a consequence of the increase in sowings, but this was far from sufficient to cover the rapid growth in population. There was an overall decline in rural per capita production by about 3% over this period. The sharpest decline was in the NCR, where there was almost a 20% decline. Thanks to its rapid increase in sowings as well as yields the EPR experienced almost a trebling of its production over this period and an increase in per capita production by over 38%. The other two producer regions saw a decline in per capita production, although not as much as in the NCR. In the Ukraine (SPR) there was a 13% decline in rural per capita production, while in the CPR there was an 8% decline.

This picture is much more dismal than the one that appears from an analysis of the Fortunatov Mikhailovsky yield data. I have calculated the comparable yields from the latter data and have compared them with the yields from Kovalchenko's data in the table below:

Year	Yield in 'sam' from Fortunatov/ Mikhailovsky	%	Kovalchenko	%
1802/11	3.50	100	3.29	100
1841/50	3.60	102.9	3.26	99.1
1851/60	3.65	104.3	3.16	96.0

Source: See appendix and tables above.

In as much as we know that Kovalchenko's figures refer to comparable regions I would recommend the acceptance of Kovalchenko's data in preference to the Fortunatov/Mikhailovsky series[1].

iii) The Nifontov/Pronin grain production data 1850-1900

In the 1970s two other Soviet historians carried the investigation of the data included in the annual accounts of the provincial governors further, to the end of the nineteenth century. A.S.Nifontov analysed grain production in the 50 gubernii of European Russia from 1850-1900 using the data in the governors' accounts from 1850-1882 and the basic TsSK data from 1883-1900[2]. Apart from his rough regional breakdown (which I have adapted)[3] Nifontov provides data for the different grains that were sown and for the different kinds of producers: the peasants working their allotments and the landowners on their estates (see following sections e) below). Nifontov also considers the available utilisation data and constructs a rough utilisation balance (see following chapter).

Nifontov's data on the 50 gubernii of European Russia can be supplemented by the data which Pronin has more recently published covering grain production and utilisation in Siberia[4]. Pronin's data are much less detailed than Nifontov's. No annual figures are given and there is no breakdown according to type of grain or to type of producer.

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1. It seems to me to be doubtful whether the explanation of the difference could be simply in terms of the different grains covered. The decline in yields in the NCR where rye would predominate appears to have been the largest regional decline.
2. A.S.Nifontov, Zernovoye proizvodstvo Rossii vo vtoroi polovinye XIX veka, po materialam ezhegodnoi statistiki urozhaev Evropyeskoi Rossii, M.1974
3. See appendix
4. V.I.Pronin, 'Dinamika urovnya zemledelcheskogo proizvodstva sibiri vo vtoroi polovinye XIX-nachalye XX veka', in Istoriya SSSR, 1977, no.4, pp.58-75.

Nevertheless in its major outlines it can be easily integrated with Nifontov's data, and thereby allows our detailed regional analysis of grain production to be carried back to 1850 for European Russia and Siberia[1]. Let us consider first Nifontov's annual grain production data. Nifontov's implicit[2] yield data for all grains in the 50 gubernii of European Russia are compared with Mikhailovsky's yield data in the following diagram[3] The close correlation between the two series is readily visible, especially for the period from the mid 1880s onwards. For the earlier period Mikhailovsky's data appear to be consistently higher than Nifontov's data, although following the same fluctuations.

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1. It is to be hoped that a study of grain production and utilisation in the North Caucasus will soon appear.
2. The yield data in 'sam' have been calculated from Nifontov's production and seed data, both of which were given in chetvert.
3. See appendix for actual figures. In the appendix annual data are also for grain production, sowings and yields with a breakdown according to winter and spring grains.

This would tend to confirm that the pre-1883 data refers to rye yields only, while the later data refer to yield for all grains. The yields of rye and winter grains in general were higher than those for spring grains (and therefore the all grain average) at this time[1].

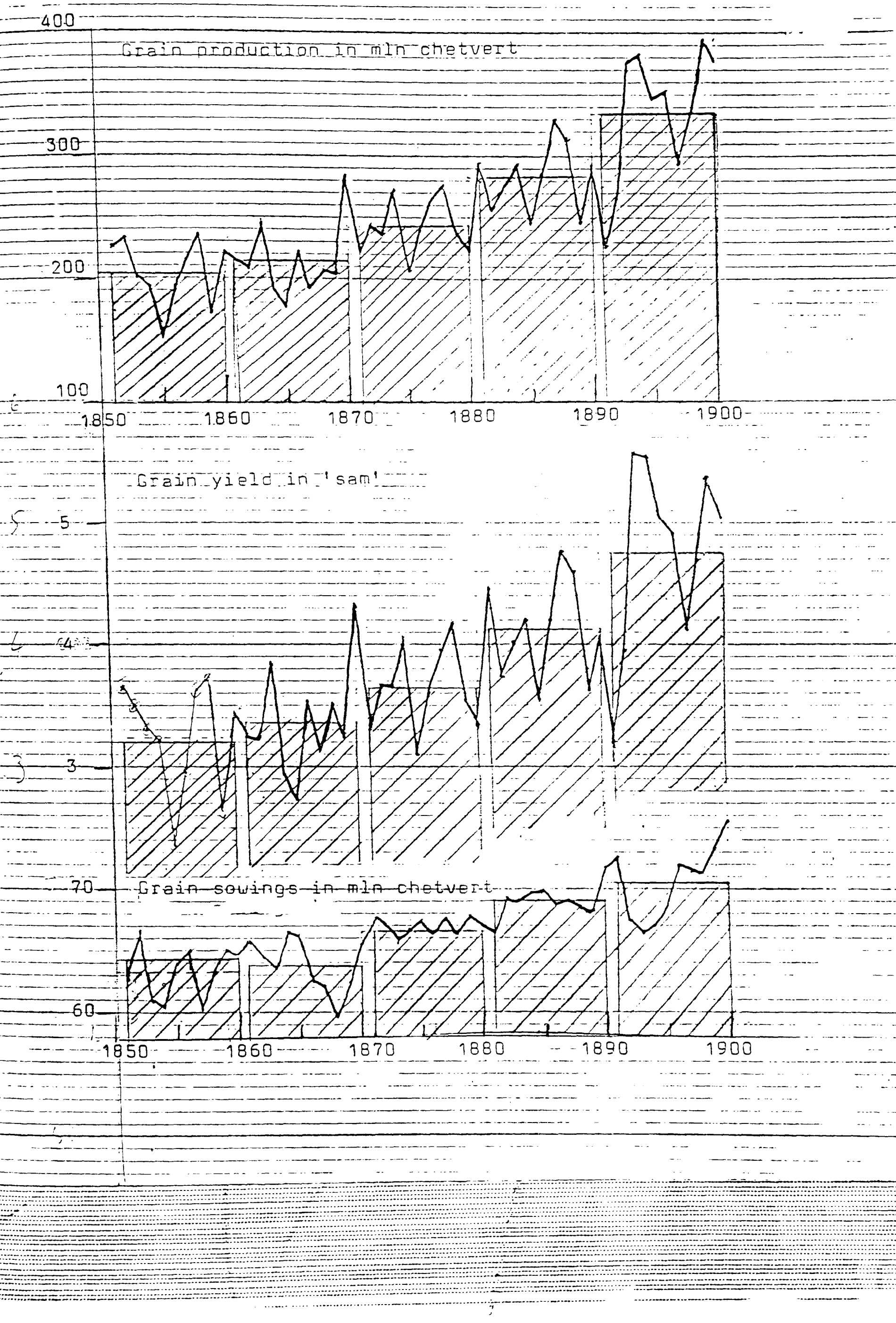
The effect of combining an early rye yield series with a later all grain yield series, was to slightly deflate the extent of growth of grain yields in this period. It is recommended that where available Nifontov's data be preferred to that of Mikhailovsky. Nifontov's data are in any case available in more detail as will be seen below. However, in as much as Nifontov's coverage only goes back as far as 1850, and for individual years for sown area and yield only back to 1861, an attempt has been made to deflate the Mikhailovsky yield data for the 1850s and to use it in combination with the Nifontov production data in order to carry our analysis of annual data back to the decade before the peasant emancipation.

The following graphs show the changing levels of grain production, grain yields and grain sown area in the 50 gubernii of European Russia from 1851-1900. The data upon which they are based and their sources are given in the appendix[2].

The great fluctuations in the annual series of all these elements but especially the yield data are readily visible. In the graphs I have also indicated the average levels for the different decades. Most of the more detailed data is only available for these ten-year groups and so it is advisable to see just what these ten-year averages are covering before we get involved in more detailed regional or sectoral data. The yield data are highly cyclical with at least two cycles per decade and

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1. See appendix
2. See appendix p.4


400
Grain production in mln chetvert
300
200
100
1850
1860
1870
1880
1890
1900
Grain yield in 'sam'
5
4
3
70
Grain sowings in mln chetvert
60
1850
1860
1870
1880
1890
1900

sometimes more. Some of the cycles were of very great amplitude and caused great problems with the severity of their down-swing. The trough of 1891, which resulted in the 1891/92 famine is the most obvious case. But the effect of this down-swing is completely lost in the averages. The down-swing associated with the 1891/92 famine could be dated from the 1889 harvest to the 1892 harvest, affecting all four years. 1889 and 1890 fall within the 1880s decadal period and are fairly well reflected in the decadal level. But the more serious years of 1891 and 1892 fall within the 1890s decadal period and are totally masked by the good harvests later on in the decade. The decadal averages show a remarkably rapid growth in yield from the 1880s to the 1890s and no hint at all of the discontinuity and disturbances caused by the 1891/92 famine.

The sown area data *are* more regular, but the discontinuities, the troughs of the late 1860s and the early 1890s stand out all the more for that. The early 1890s decline is again totally off-set by the rise in the late 1890s and finds no reflection at all in the decadal averages. The decline in the late 1860s however does find a slight reflection in the 1860s average data.

The Nifontov and Pronin data in decade averages will be presented and analysed below in this section. And they will certainly be very useful in providing us with an indication of the long term trends in grain production. But because most of the detail in these series is given in decade averages only I have had to resort to compiling my own detailed annual data when I wish to analyse the nature of the individual production and utilisation crises within this period. This annual data on a regional basis from 1883-1914 together with Nifontov's annual data

for the 50 gubernii of European Russia will be presented and analysed in the next section.

An indication of the regional distribution of grain production and the changes in its pattern for decade averages from the 1850s and in comparison with Kovalchenko's earlier figures, is given in the following table:

Grain production in mln.tons from Nifontov and Pronin's data for the European part of Russia and Siberia 1850-1900 in mln.tons.

	NCR(K)	SPR(K)	CPR(K)	EPR(K)	USSR(K)
1802/11	7.21	3.72	7.46	1.13	19.51
1840s	7.08	4.31	9.64	2.66	23.69
1850s	6.91	4.55	9.97	3.00	24.43

	NCR(N)	SCR	SPR(N)	CPR(N)	EPR(N&P)	USSR-SCR
1850s	6.90		5.15	10.86	3.48	26.39
1860s	6.89		5.69	11.78	3.46	27.81
1870s	7.17		7.35	12.89	4.19	31.59
1880s	8.06		9.85	14.11	4.87	36.89
1890s	8.92		14.09	14.32	6.49	43.82
1900s	8.88		20.27	16.03	6.96	52.14
1905-15	10.31		25.41	18.62	9.17	63.51

Sources: See appendix

The change in share of the different regions can readily be seen from the following table:

	NCR(K)	SPR(K)	CPR(K)	EPR(K)	USSR
1802/11	37.0%	19.1%	38.2%	5.8%	100%
1840s	29.9%	12.2%	40.7%	11.2%	100%
1850s	28.3%	18.6%	40.8%	12.3%	100%

	NCR(N)	SCR	SPR(N)	CPR(N)	EPR(N&P)	USSR-SCR
1850s	26.1%		19.5%	41.2%	13.2%	100%
1860s	24.8%		20.5%	42.4%	12.4%	100%
1870s	22.7%		23.3%	40.8%	13.3%	100%
1880s	21.8%		26.7%	38.2%	13.2%	100%
1890s	20.3%		32.2%	32.7%	14.8%	100%
1900s	17.0%		38.9%	30.7%	13.3%	100%
1905-15	16.2%		40.0%	29.3%	14.4%	100%

We see a sharp decline in the importance of the CPR and NCR and a corresponding sharp increase in the significance of SPR after the 1860s. The EPR after its rapid increases at the beginning of the century keeps about the same proportions throughout the second half of the century. Within the CPR it is the Central Chernozem region which falls the most (from 24.3% of all production in the 1850s to 15.6% in 1905-15) while the Volga regions fall less (from 17.2% in the 1850s to 13.7% in 1905-15)[1].

In terms of changes in per capita production we see the following dynamic:

	NCR(K)	SPR(K)	CPR(K)	EPR(K)	USSR(K)
1802/11	0.503	0.430	0.668	0.379	0.525
1840s	0.414	0.370	0.632	0.530	0.483
1850s	0.408	0.374	0.614	0.525	0.479
	NCR(N)	SPR(N)	CPR(N)	EPR(N&P)	USSR(N&P)
1850s	0.404	0.396	0.602	0.528	0.449
1860s	0.390	0.392	0.625	0.478	0.477
1870s	0.373	0.459	0.626	0.510	0.493
1880s	0.378	0.513	0.585	0.513	0.497
1890s	0.362	0.578	0.555	0.591	0.511

Sources: see appendices

Note: these figures are per capita of rural population

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1. See appendices for further detail.

There was a continuation of the sharp decline in rural per capita production in the NCR. By the 1890s it had a level of per capita production 30% lower than the national average and 35% lower than in any other region. The earlier decline in per capita production in the SPR was sharply reversed, and by the 1890s its level of per capita production had outstripped that of the CPR which continued to decline after the 1870s. After a sharp decline in the EPR in the 1860s there was a sharp increase in per capita production by the end of the century, resulting in the EPR having a higher level of per capita production than any other region. The net effect of all these regional changes was for there to be an overall rise in per capita production, although its level in the 1890s appears, according to these data, to still have been 3% below the 1802/11 level.

To what extent these levels and changes in the level of production were due to changes in the level of sown area or of yield can be seen from the following data:

Region	1850s	1860s	1870s	1880s	1890s
NCR(N)					
Production	54781	54660	56895	63970	70808
Sowings	20653	18928	18206	18721	18537
yield in 'sam'	2.65	2.89	3.13	3.42	3.82
SPR(N)					
Production	40882	45116	58326	78195	111816
Sowings	11140	12613	15376	15615	18698
yield in 'sam'	3.67	3.58	3.79	5.01	5.98
CPR(N)					
Production	86986	93498	102289	111973	113665
Sowings	25989	25519	25895	26239	24285
yield in 'sam'	3.35	3.66	3.95	4.27	4.68
EPR(N&P)					
Production	27584	27430	33225	38629	51497
Sowings	7859	8733	9561	10870	11888
yield in 'sam'	3.51	3.14	3.48	3.55	4.33
USSR(N&P)					
Production	210233	220704	250735	292767	347786
Sowings	65641	65793	69038	71445	73398
yield in 'sam'	3.20	3.35	3.63	4.10	4.74

Sources: See appendices
Notes: See appendices, Production and sowings are given in mln. chetvert, yields are given in 'sam' (production per unit sown by volume).

To ease comparison, in the following table all the data have been turned into indices with the values in the 1850s equal to 100.

Region	1850s	1860s	1870s	1880s	1890s
NCR(N)					
Production	100	99.8	103.9	116.8	129.3
Sowings	100	91.6	88.2	90.6	89.8
Yield	100	109.1	118.1	129.1	144.2
SPR(N)					
Production	100	110.4	142.7	191.3	273.5
Sowings	100	113.2	138.0	140.2	167.8
Yield	100	97.5	103.3	136.5	162.9
CPR(N)					
Production	100	107.5	117.6	128.7	130.7
Sowings	100	98.2	99.6	101.0	93.4
Yield	100	109.3	117.9	127.5	139.7
EPR(N&P)					
Production	100	99.4	120.5	140.0	186.7
Sowings	100	111.1	121.7	138.3	151.3
Yields	100	89.5	99.1	101.1	123.4
USSR(N&P)					
Production	100	105.0	119.3	139.3	165.4
Sowings	100	100.2	105.2	108.8	111.8
Yields	100	104.7	113.4	128.1	148.1

From these index numbers it can be readily seen that overall the increase in production was a consequence of a gradual increase in the size of sowings (by 12% in 50 years) and a very rapid increase in the average level of yields (four times as great as the increase in sowings i.e. an increase by 48% in 50 years). The increase in yields came predominantly in the 1880s and 1890s when the rate of increase in sowings was somewhat slowing down. But this aggregate picture covers quite a variety of differences in the different regions.

The NCR(N) had the slowest of all rates of growth of production growing by only 29.3% over this period. This growth was exclusively a consequence of a growth in yields as there was over a 10% decline in grain sown area during this period. In fact most of this decline came in the first ten years after the emancipation. Thereafter the level of sowings remained about the same.

The SPR(N), the Ukraine, had on the contrary the largest of all rates of growth of production, growing by 174%. This growth was almost equally a consequence of a rapid growth in sowings (67.8% in 50 years) and of yields (62.9% in 50 years). The growth of the former was spread fairly equally over the period, while the growth in yields had come about primarily after 1880.

The CPR(N) had an overall growth in production only slightly larger than the NCR(N). Like the NCR(N) this growth was totally a consequence of a growth in yield since the level of sowings had fallen by 6.6% over this period. However unlike the NCR(N) the fall in sowings had come primarily in the 1890s. This was of course the region which suffered most from the 1891/2 famine. But there is little indication of its presence or significance in these figures.

Finally the EPR(N&P); this was an area of rapidly growing production (86.7% in 50 years) second only to SPR(N). The growth here was primarily a consequence of a 51.3% growth in sowings. The 23.4% growth in yields was the lowest for all regions, and even this had only appeared in the 1890s.

Overall we see the most rapid growth in the newer regions of the SPR(N) and EPR(N) where a very large share of the growth was a consequence of increasing sowings. In the traditional areas NCR(N) and CPR(N) overall growth was less and there was a decline in grain sowings. In all areas there was a rapid growth in yields, although this became more important in the later years.

Nifontov also provided much useful data on grain production by type of grain and by type of producer, these data will be considered later in this section under the appropriate headings.

c) Annual data

i) Sources of data

The sources of data avilable for an analysis of the annual dynamic of grain production in the pre-revolutionary period are of two kinds. There are fairly lengthy runs of annual data that are available in the secondary sources like Nifontov. But generally these are only the aggregated data i.e. the data covering the whole 50 gubernii of European Russia. In order to analyse an annual series of data with regional breakdown, it is necessary to go back to the primary source and construct our own series. Unfortunately the only available primary sources are the TsSK data covering the years 1883-1915.

The major TsSK statistical handbooks on grain were the very detailed annual publications Urozhaya....goda, which appeared from 1883 to 1915. Much data were also published in the general TsSK statistical handbooks such as Statisticheskii Ezhegodnik Rossii which appeared annually from 1903 to 1915. The Ministry of Agriculture had its own very detailed publication on grain statistics '...god v selsko-khozyaistvennom otnoshenii po otvetam, poluchennyim ot khozyaev' which appeared annually from 1881 to 1917. The Ministry also published the general TsSK grain production data in its more general annual statistical handbook, Sbornik Statistiko-Ekonomicheskikh svedenii po Sel.Khoz.Rossii i inostrannyikh gosudarstv, which appeared between 1903 and 1916. An earlier Ministry of Agriculture publication Svod statisticheskikh svedenii po Sel.Khoz.Rossii k kontsu XIX veka, SPb.1902 contains much TsSK and Ministry of Agriculture data for the earlier period (1883-1900).

Apart from these contemporary sources, there also exist three very good compilations of these early data all of which were made in the 1920s.

First, there is the compilation made by N.P.Oganovsky and his

department[1] in NKZem in 1922. This work came out under the general editorship of N.D.Kondratiev[2]. This handbook was designed to be a continuation of the former Ministry of Agriculture statistical handbook Sbornik Statistiko-Ekonomicheskikh svedenii po Sel.Khoz.Rossii, SPb 1903-16. It provides an indication of the pre-war grain production data for the five year periods 1901-05, 1906-10 and 1911-15 as well as the available results of the 1916 and 1917 agricultural censuses and the early results of the post-revolutionary TsSU investigations. This is one of the very few works which has attempted to regroup the pre-war data to make them comparable with the data for the later period. Unfortunately, the early TsSU data which were reproduced in this publication are very incomplete and it is much preferable to use the basic TsSU Trudy for these data. Similarly the pre-revolutionary data have been little used in my study as the annual data from 1901 are readily available on an annual basis from the original sources.

Secondly, there are the materials which were published by V.M. Obukhov in 1926[3]. The materials cover the sown area and yield of all grains in the 50 provinces of European Russia (excluding Poland, and the North Caucasus) from 1883-1915. The data are given separately for each main grain for all the 50 provinces and for the yields of each major grain (covering over 5% of sown area) in each province separately. There is, however, no breakdown between peasant allotment and private landowner production.

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1. The Department of the Accounts of the basic elements of agriculture in NKZem.
2. N.D.Kondratiev (ed.) N.P.Organovsky (compiler) Selskoye Khozyaistvo Rossii v XX veke, Sbornik statistiko-ekonomicheskikh svedenii za 1901-1922gg. M.1923. This book has been reprinted in the Russian Reprint Series by Europe Printing, The Hague, 1968.
3. V.M.Obukhov, Dvizheniye urozhaev zernovvikh kultur v Europ.Rossii v period 1883-1915gg, in Vliyanie neurozhaev na narodnoe khozyaistvo Rossii, ed. V.G.Groman, M.1927, pp.1-159.

Thirdly, there is a much larger work which was directed by N.S.Chetverikov and which was published in 1928[1]. These materials cover the sown area, yield, seed, straw harvest and the weight of volume measurements for all crops in all of 54 provinces of European Russia (including North Caucasus). The data are given separately for all the crops in each separate province. There are no aggregated data in this collection at all. The data are given in volume measurements from 1883-1894, in weight measurements of yield and production from 1895, and area measures of sowings from 1893. However, seeding rates are given throughout and volume to weight conversion rates are given from 1888-1915. Therefore it is possible to accurately convert the data into weight and area measurements back to 1888 and roughly all the way to 1883.

Unlike the Obukhov data, the Chetverikov data only cover peasant allotments. This data source was designed specifically to assist agro-meteorological investigation, as Chetverikov states in the preface. Because of the lack of aggregation and the weight/volume problems it will not be used in this part of the study.

Obukhov spends very little time discussing the reliability of these TsSK data, however he does state in passing that it is far more useful to study these data than those of the Ministry of Agriculture or the zemstvo because they are far more homogeneous and internally comparable as concerns method of collection and regionalisation than are the other data. However he does admit that they may be a little lower than the real level of production (by 5-7%)[2]

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1. Svod urozhainykh svedenii za gody 1883-1915, materialy tsentralnogo statisticheskogo komiteta po urozhayam na nadelnykh zemlyakh, M.1928 p I
2. V.M.Obukhov, ibid., p.1.

The only other series of data which are available are all in highly aggregated forms. The best known of such series of aggregated figures, in the West, are perhaps those cited by the American economist R.W.Goldsmith. Goldsmith in his investigation of the growth of pre-war Russian agriculture provided two sets of data one covering the 50 provinces of European Russia from 1870-1915 and the other the 72 provinces of European Russia, Poland, North Caucases, Siberia and the Steppe[1]. Both series are given in aggregate form with no attempt at any regional breakdown.

The first series is an aggregate of a very dubious series for 1870-1880 and the official TsSK series from 1883-1914. The 1870-1880 series covers only 4 main grains. It has to be mechanically adjusted to include the Polish provinces. It has been converted from weight to volume measurements by using standard coefficients and there are no sown data to accompany it.

The second series for the 72 provinces covers the period 1885-1915 and was taken from the Ministry of Trade and Industry handbook[2].

In my analysis of the TsSK data I have taken the annual figure for each separate gubernia and classified it into my five major regions. The data for the 50 guberniı of European Russia were taken directly from Obukhov's compendium. The available data for the non-European gubernii were taken from Svod statisticheskikh svedenii...,SPb.1902 and various editions of Sbornik Stat.Ekon.Svedenii...,SPb.1903-16. See the appendix. Comparable population data were compiled in a similar way by gubernii from the population data compilations available in Zaitsev and Volkov[3].

1. See R.W.Goldsmith, The economic growth of Tsarist Russia,1860-1913, mimeographed appendix and article in Economic development and cultural change,
2. A.K.Broshniovskii, Usloviia byta russkikh khlebza granitsu, P.1914 p.112. This source was also reproduced in English by V.P.Timoshenko, Russia and the Wheat Problem, Stanford 1932, pp.522,526,528.
3. See V.Zaitsev, Vliyaniye kolebanii urozhaev na estestvennoe dvizheniye naseleniya, in V.G.Groman (ed.), Vlivanie neurozhaev na narodnoye khozyaistvo Rossii, chast 2, M.1927,pp.66-90, and E.Z.Volkov, Dinamika naseleniya SSSR za vosemdesyat let, M.1930. See appendix.

c)

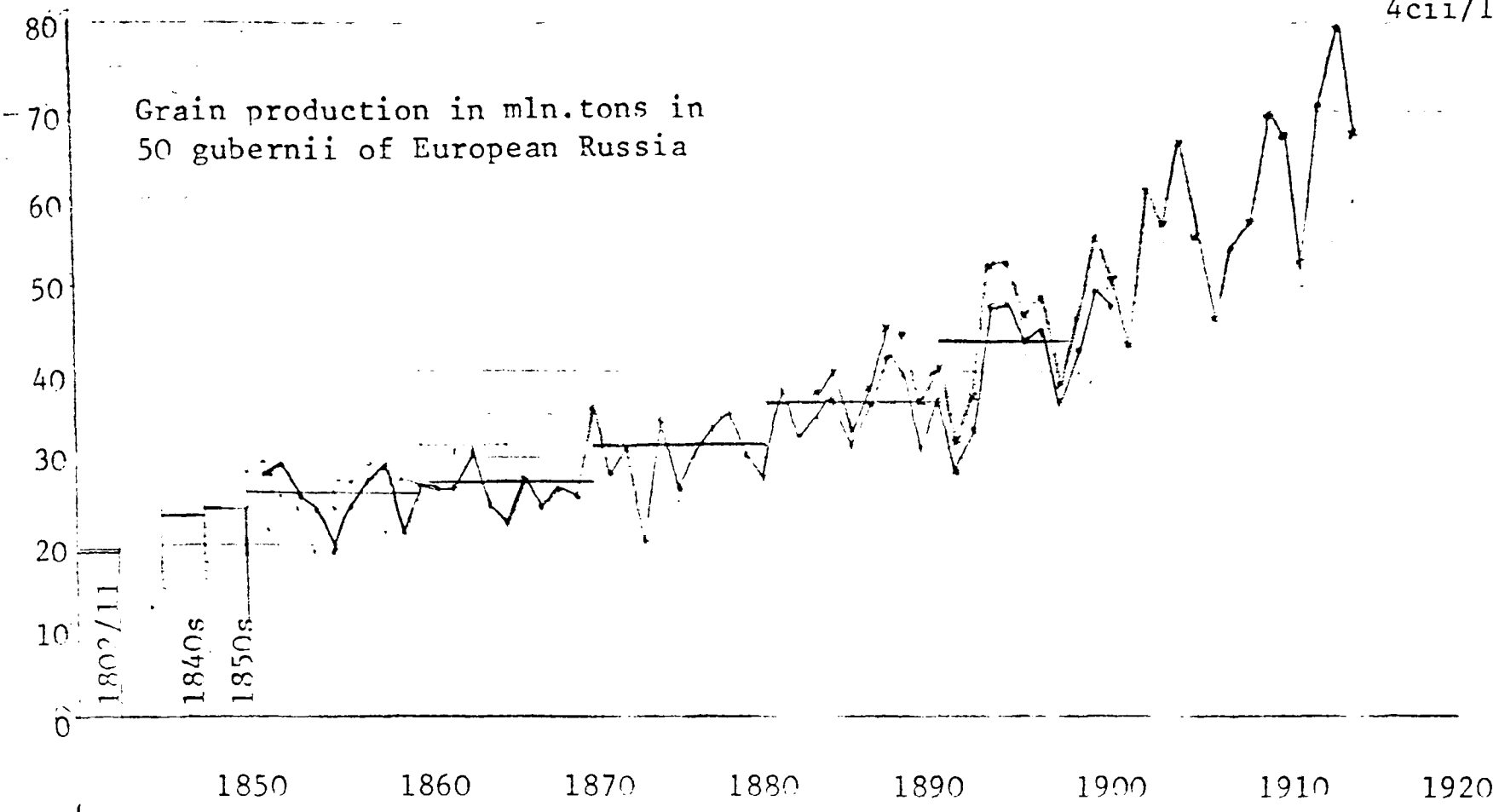
ii) Results of my analysis of annual data

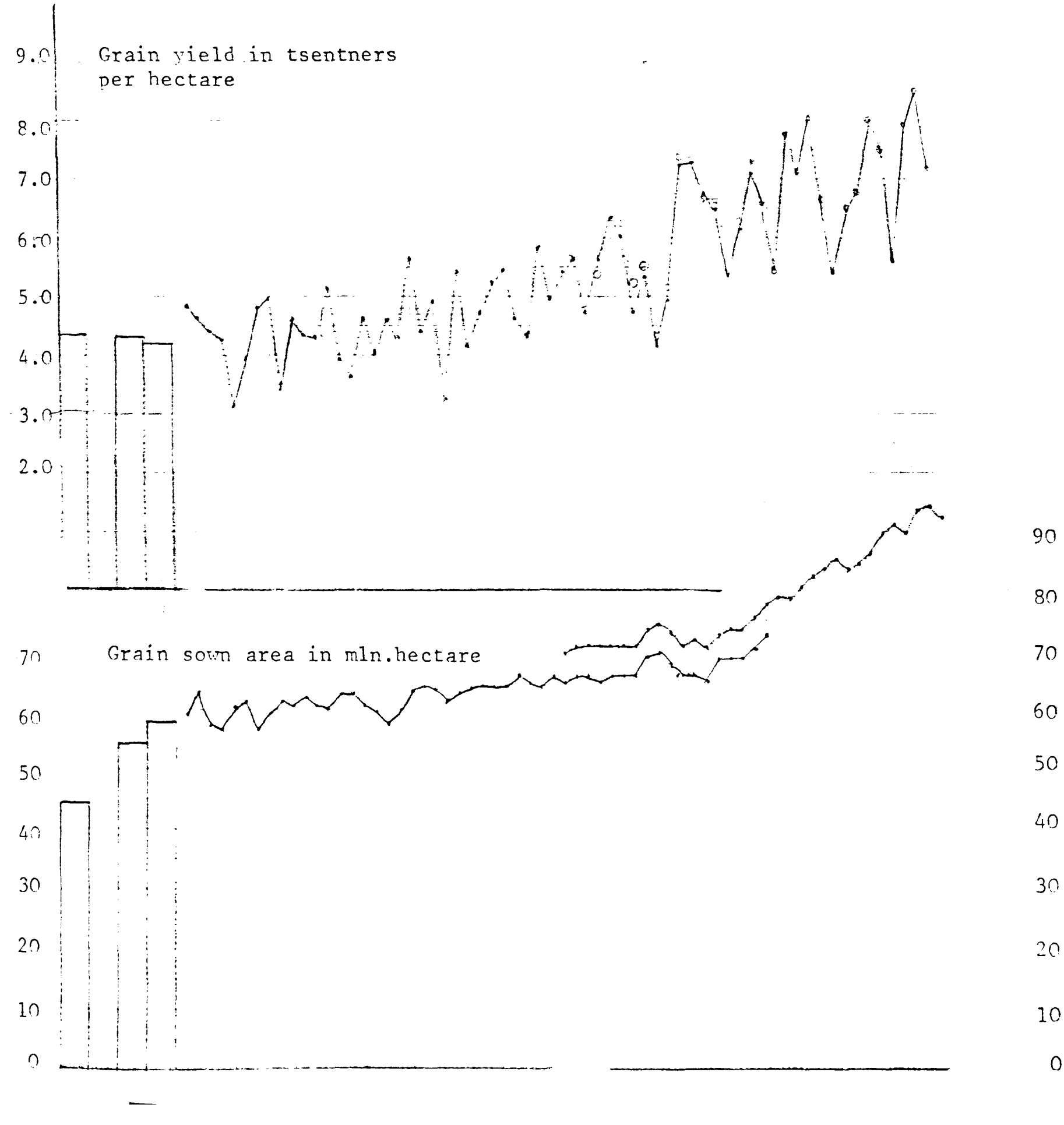
The results of my analysis of the annual data are given in tabular form in the appendices. Here the results have been plotted on graphs in order to give a fuller impression of the extremely complex dynamic. Wherever possible some rough indication of the longer term dynamic has also been presented to give these figures a more complete perspective.

In graph 4cii/1 we see the annual dynamic of grain production and its component elements sown area and yield. The level of grain production fluctuates quite considerably as a consequence of fluctuations in the annual level of yield. The irregularity and severity of these fluctuations make it extremely complicated to measure the growth rate of grain production and the contribution of its component elements. The growth rates calculated below are based on fitting a straight line of least squares deviation onto the curve over specific periods, on measuring the slope of this line and by dividing the annual increment of the straight line by its mean. The growth rates are highly dependent on the periodisation used. In the calculations made below I have measured the growth rate a) over the entire period of Nifontov's data i.e. 1851-1900, and over the entire period of the available TsSK data i.e. 1883-1914. But apart from these conventional periods I have also regrouped the data according to b) the break in the continuity of the sown area data which came in 1895, c) the periodisation of the yield fluctuations, selecting the periods i) according to peaks in the cycle and ii) according to troughs.

Taking first the 1851-1900 data for the 50 gubernii of European Russia, if we take the period as a whole we see there was an annual average growth of production of 1.3% of which about a quarter (26.3%)

4cii/1


Grain production in mln.tons in
50 gubernii of European Russia
80
70
60
50
40
30
20
10
0
1802/11
1840s
1850s
1850
1860
1870
1880
1890
1900
1910
1920


Grain yield in tsentners
per hectare
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
Grain sown area in mln.hectare
90
80
70
60
50
40
30
20
10
0

is explained by an annual average growth in sown area (0.34% per year) while the remaining three quarters (73.8%) was due to an average annual growth in yields (0.95% per year). If we look at shorter periods and calculate the growth rates from trough to trough or peak to peak we see an acceleration in the growth rate for both the elements with an increased although still minority share in the total growth from the growth in sown area:

Years	Average Annual Growth rate of Production	Sown area	Yield	Share in growth Sown area	Yield
1851-1900	1.30%	0.34%	0.95%	26.2	73.1
1851-70	0.47%	0.14%	0.32%	29.8	68.1
1855-73	0.71%	0.21%	0.48%	29.6	67.6
1851-87	1.08%	0.30%	0.76%	27.8	70.4
1873-91	1.35%	0.42%	0.97%	31.3	71.9

Source: see appendix.

Turning now to the TsSK data for the pre-1939 area of the USSR from 1883-1914, and taking this period as a whole we see that the annual average growth in grain production had risen to 2.11% and that over half of this was due to the annual average growth in grain yields by 1.1% and that the rest was due to the growth in sown area by 1.0% per year. There appears to be a fairly distinct break in the dynamic of the sown area data with a sharp increase in sown area beginning after 1895. If we divide the data at this point we see that in the earlier period (1883-1895) the growth in production is predominantly (92.5%) as a consequence of a growth in the average annual yield level, while in the later period (1895-1914) the growth in the level of production is predominantly (62.3%) a consequence of a growth in the average annual sown area:

Years	Average annual growth of Production	Sown Area	Yield	Share in growth Sown Area	Yield
1883-1914	2.11%	1.00%	1.10%	47.4	52.1
1883-1895	2.12%	0.19%	1.96%	9.0	92.5
1895-1914	2.36%	1.47%	0.89%	62.3	37.7

Source: see appendix.

In order to check that the observed shift in relative importance of increases in sown area and yield is not merely the consequence of the selection of odd years I have calculated the growth rate for these later years selecting several cycles of yield fluctuations measuring from peak to peak and from trough to trough. Both calculations give the same result showing a relative decline in the rate of growth of grain yields in the later years and the increasing significance of the growth in sown area.

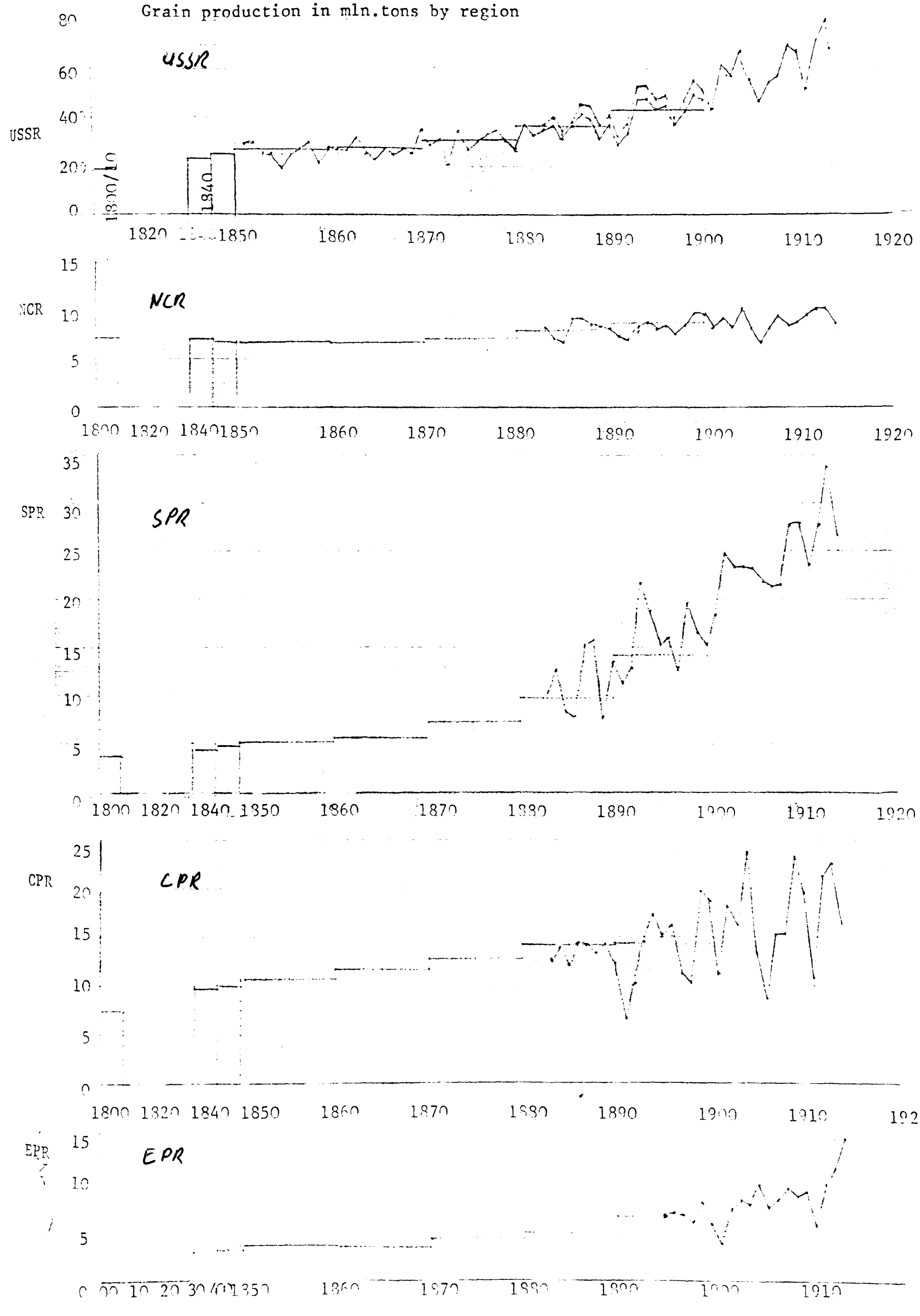
Years	Average annual growth of Production	Sown Area	Yield	Production	Sown Area	Yield
1883-1914	2.11%	1.00%	1.10%	100	47.4	52.1
1891-1911	2.02%	1.26%	0.79%	100	62.4	39.1
1894-1913	2.19%	1.44%	0.71%	100	65.8%	32.4%

Source: see appendix.

Graph 4cii/2 presents the dynamic of grain production for the area of the USSR as a whole and for the four major regions. The level of production in the four major regions is shown to comparable scale but the level of USSR production as a whole is presented at a quarter of the comparable scale.

I have calculated the average annual growth rate and the mean values for the different regions over the 1883-1914 period and these have been presented in the table below to indicate the relative share of the

Grain production in mln.tons by region

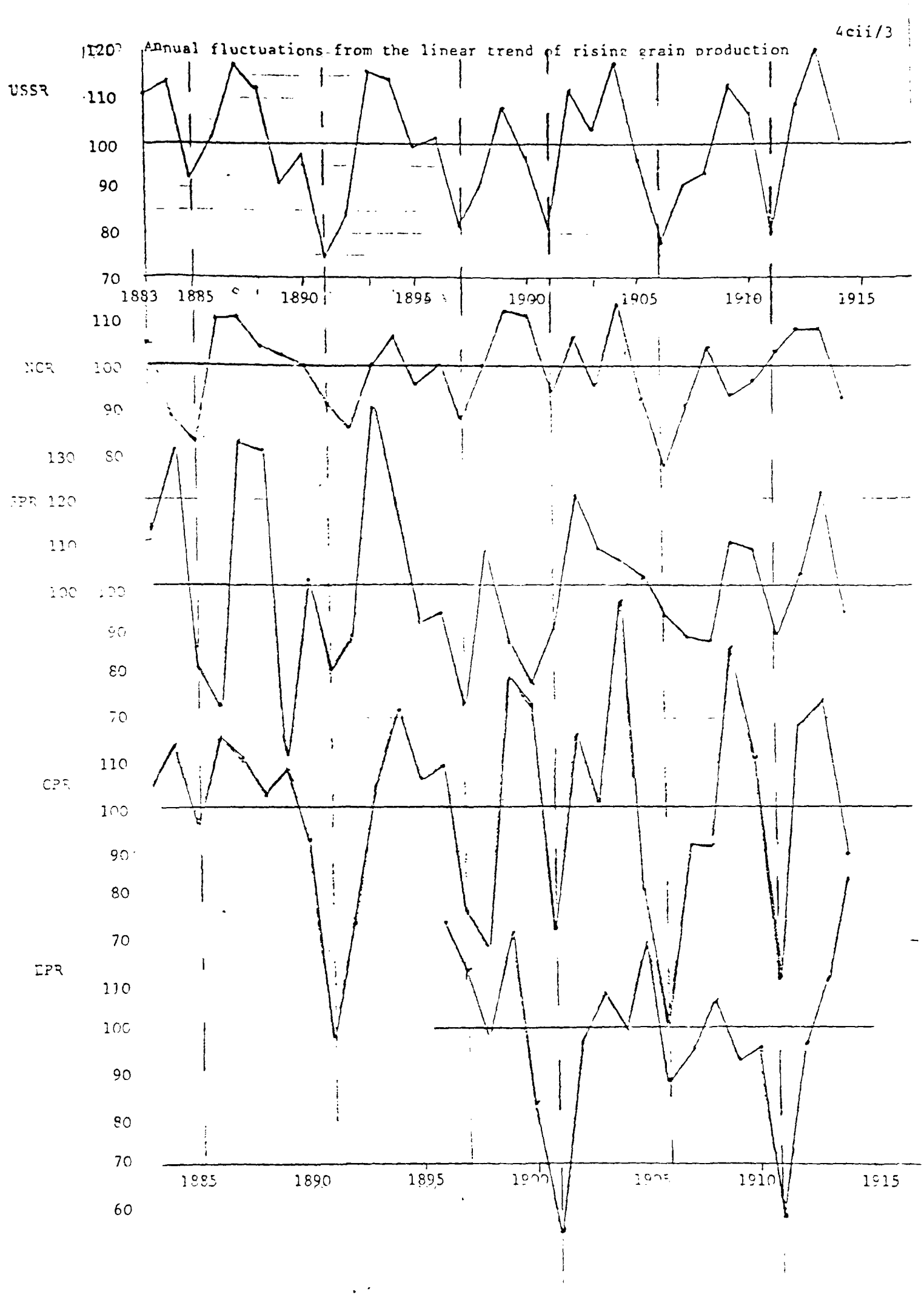


different regions in the average level of grain production over this cumulatives period and in its growth rate.

Region	mean level	Annual average growth rate	Contribution to total growth	
NCR	8.58	0.52%		
SCR	1.60			
SPR	18.63	3.33%		
CPR	15.09	1.37%		
EPR	6.96	2.19%		
USSR	50.86	2.11%		
NCR	17.4%	0.52%	0.09%	(4.3%)
SCR	3.1%	0.	0.	(0.)
SPR	37.8%	3.33%	1.26%	(60.6%)
CPR	30.6%	1.37%	0.42%	(20.2%)
EPR	14.1%	2.19%	0.37%	(14.9%)
USSR	100.0%	2.14%	2.08%	(100%)

Source: see appendix.

This table indicates that over this period the SPR accounted for on average 38% of the production level, but was responsible for 60% of the growth over this period. It was therefore rapidly increasing its share. The next largest region the CPR covered on average 31% of USSR production and was responsible for less than 20% of the growth. Its share in the level of USSR production would consequently be falling. The EPR covered on average 14% of USSR production and was slightly increasing its share as it was responsible for over 15% of the growth in production. The NCR covered on average 17.4% of total USSR production over this period, but must have been rapidly losing its share since it only contributed 4.3% to the average growth over this period. No SCR data are available for the early years. It contributed about 3% to the average level of production and would have made a very insignificant contribution to the growth rate over this period.


4cii/3
Annual fluctuations from the linear trend of rising grain production
USSR
NCR
CPR
EPR
120
110
100
90
80
70
130
60
1883
1885
1890
1895
1900
1905
1910
1915

Let us turn now to consider not the overall growth rate but the significance of annual fluctuations. The annual fluctuations from the linear 1883-1914 trend are calculated in the appendix and are presented in graph form in graph 4cii/3.

The standard deviation of the fluctuations from the trend is 13% for all the regions taken together, 9.3% for the NCR, 19.4% for the SPR, 24% for the CPR and 20% for the EPR.

In graph 4cii/3 I have placed a broken vertical line at the years with a major trough in the cycle of fluctuations of the USSR data. The most serious troughs occurred in 1891 (25% below norm) and 1906 (21.6% below norm). These corresponded with the two lowest points in the CPR fluctuations: 1891 being 51% below norm and 1906 being 48% below norm. But these do not correspond to the lowest points in the other regions. For the SPR 1889 was much lower than 1891 (40% below norm cf. 19%) and for the NCR 1892 was lower than 1891 (13% cf. 10%). While 1906 was also a low point for the NCR (22% below norm), the low point in the comparable SPR cycle came two years later in 1908 at a mere 12% below norm. For the EPR 1906 was a fairly low point (11% below norm) but its lowest point came in 1901 (45% below) and 1911 (41% below norm).

As the CPR began to lose its predominant place as the major producer region, and as other regions began to become more important the overall influence of the extreme CPR fluctuations began to be modified by the less extreme fluctuations in the other regions and by the slightly different synchronisation of the fluctuations in the other regions.

Graph 4cii/4 relates the production data for the area of the USSR and its major regions to the population data for these regions and indicates the changes in per capita production levels for these different regions over this period. When adjusted for the very rapid growth in population much of the growth in production visible in graph 4cii/2a disappears. The annual average growth for the USSR from 1883-1914 is reduced from 2.11% to 0.38% per head. In the NCR the growth in production by 0.52% per year is totally inadequate to cover the very rapid increase in population and results in an actual decline in per capita production by 0.71% per year. The same phenomena, only to a lesser extent occur in the CPR where the growth in production by 1.37% is converted into a decline in per capita production by 0.16% per year. Only in the SPR and the EPR do we observe a rapid growth in per capita production. In the SPR the effect of the growth in population was only to reduce the growth rate from a very rapid 3.33% to a still substantial 1.51% annual per capita growth. In the EPR the growth in population reduced the annual average growth of production from 2.19% per year to 0.76% per capita per year.

This is a clear indication that the NCR was getting even less self sufficient and that the level of production in the CPR was not keeping up. The position in these two older more established grain producing areas was very different to the dynamic position in the SPR and the EPR.

GRAIN PRODUCTION IN TONS PER CAPITA OF ALL POPULATION

d) War time data on grain production

The TsSK data continued to be collected and published for the first two years of the war. The results for some of the more distant regions of Transcaucasia, Central Asia and Siberia were however not available when the last TsSK statistical handbook covering 1915 was published. The values for these missing regions have consequently had to be estimated. The results for these years have already been included in the 1883-1915 series given above, but will be quickly summarised here:

	NCR	SCR	SPR	CPR	EPR	USSR	USSR -SCR
Production							
in 1909/13	9.4	2.0	28.1	19.6	8.8	67.8	65.9
mln. 1913	10.1	2.1	33.6	22.5	11.3	79.7	77.6
tons 1914	8.7	2.1	26.5	16.4	14.1	67.8	65.7
1915	10.4	(2.1)	(27.6)	23.2	(11.0)	74.3	72.2
Sown area							
in 1909/13	17.8	2.9	33.6	27.3	13.5	99.1	37.1
mln. 1913	13.0	3.2	34.4	27.6	15.5	93.7	90.5
hec- 1914	12.9	(3.0)	34.6	27.5	16.0	94.0	91.0
tare 1915	12.5	(3.0)	(33.4)	27.3	(16.6)	(92.9)	89.8
Yield							
in 1909/13	7.4	6.7	8.4	7.2	6.5	7.5	7.6
tsent-1913	7.8	6.5	9.8	8.2	7.3	8.5	8.6
ners 1914	6.7	(6.6)	8.0	6.0	8.8	7.2	7.2
per 1915	8.3	(6.6)	8.3)	8.5	(6.6)	(8.0)	8.0
hect-							
are							

Source: See appendix.

These data indicate only a very slight decline in sown area from 1913 and a 3.1% increase overall if the 1915 figures are compared with the 1909/13 average. The growth was entirely due to the large increase in sowings in the EPR. The 1915 EPR sowings were recorded as being over 23% higher than the 1909/13 level.

The level of yields remained fairly high in these first two war years especially in 1915. In 1914 the CPR and NCR yields were a little lower

than normal (9.5% below the 1909/13 average in the NCR and 16.7% below in the CPR). But these kind of fluctuations were quite normal, as we have seen above. The 1915 yields appear to have been good in all regions but especially in the NCR and CPR (respectively 12.6% and 18.1% above the 1909/13 averages).

As explained above the 1916 and 1917 data on grain production came from the agricultural censuses (for sown area) and the local correspondents' and local statisticians' reports of the yield. The following table is compiled from a 1924 volume of the Trudy TsSU supplemented with some figures for the SCR from Lositsky's report on the 1917 harvest.

Year	NCR	SCR	SPR	CPR	EPR	USSR	USSR -SCR
Production							
1909/13	6.9	2.8	27.7	17.6	11.0	65.9	63.1
1916	6.3		23.9	15.2	11.7		57.0
1917	5.5	1.8	24.1	11.0	14.4		54.9
Sown Area							
1909/13	9.5		32.9	24.0	17.4		83.7
1916	8.2		29.3	22.2	20.1		79.7
1917	8.3		29.1	22.6	19.9		79.8
Yield							
1909/13	7.2		8.4	7.3	6.3		7.5
1916	7.7		8.2	6.8	5.8		7.2
1917	6.6		8.3	4.8	7.3		6.9

Source: Trudy TsSU, Tom XVIII, M.1924, pp.122-5, 131-2.

These figures indicate a fall of sown area in the NCR, SPR and the EPR of about 10% in comparison with 1915. The NCR and SPR would consequently have a level of respectively 14 and 12% below their average 1909/13 level, but the EPR would still remain some 14% higher than this level. The decline in the CPR was less at only 6% bringing this level just 6% below

the pre-war level. Overall this indicated a decline of 7.8% in comparison with the 1915 level but of only 5% in comparison with the 1909/13 level. The censuses record hardly any change at all between the 1916 and 1917 sowings.

I do find these results a little surprising. It is hard to explain why there should have been only a very moderate decline in sowings between 1913 and 1915, a very sharp decline from 1915 to 1916 and then hardly any decline at all from 1916 to 1917. It is very tempting to suggest that this apparent decline from 1915 to 1916 could have been the result of the change in methodology of calculating grain sown area at that time. Could the census have under-estimated the level of grain sowings by 7-10%?

P.Rumyantsev, head of the statistical department of the special food council, stated in his report on the 1916 harvest in November 1916 that the local zemstva were providing him with indications that the census was under-estimating reality in some gubernii by from 5-15%[1]. Rumyantsev's successor A.E.Lositsky also appeared to believe that there was much more grain in the country than was indicated by the production figures that he was using[2]. And later in Gosplan N.M.Vishnevsky was to argue that the indications of the quantity of arable land received from the 1917 census were between 4 and 17% lower than the local zemstvo reports of the size of arable land in their area and that this therefore indicated the degree of under-estimation involved in the census[3]. The data upon which these conclusions were made came from 7 zemstvo statistical offices and are listed below:

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1. See P.Rumyantsev, Urozhai khlebov v Rossii v 1916g., P.1916, p.VII
2. See p.258
3. See N.M.Vishnevsky, Statistika i selsko-khozyaistvennaya dyeistvitelnost, in Sel.i Les.Khoz., 1922, No.9-10, special supplement pp.24-6.

Data on size of arable land in 1917 from different sources

	Zemstvo data in mln.des.	1917 census data in mln.des.	Indicator of extent of under-estimation
Penzenskaya G.	2.256	2.087	8.1%
Tulskaya G.	2.028	1.954	3.8%
Bryanskaya G.	0.886	0.738	20.1%
Ekaterinoslavskaya G.	2.251	1.959	14.9%
Novgorodskaya G.	0.623	0.600	3.8%
Simbirskaya G	2.048	1.783	14.9%
Ryazanskaya G.	2.072	1.901	9.0%
Average			10%

Source: N.M.Vishnevsky, ibid., p.24.

Note: Penza and Tula of course were the home towns of Groman and Popov.

These arguments were not accepted by the statisticians who claimed that the zemstvo data that Vishnevsky was using were out of date[1]. But it is probably true that the statisticians as a whole found it difficult to accept that their census that they had worked so hard to be allowed to carry out was defective. Arguments about the reliability of these data were to rage for the next decade. They centred mainly around the utilisation balances and will be discussed later. Here I just want to remark that there must be some doubt as to the comparability of the 1916 data with the 1915 and earlier data, and that the apparent sharp decline in sowings which appears between 1915 and 1916 was probably not as severe as it appears.

Let us now turn to an analysis of the yield data. The yield data in the above table indicate that the 1916 level ofyields was overall about the same as in 1914 about 4% below the 1909/13 average. It was 7% higher

1. See later p. [illegible]

than the average pre-war level in the NCR, about 2½% lower in the SPR and between 7 and 8% lower in the CPR and EPR.

In 1917 the overall level of yield fell by another 4% to be 8% below the 1909/13 average. The yield in the EPR appears to have been very high, some 15.9% above the pre-war average. But the yield in the CPR was extremely low, over 34% below the 1909/13 level. These were the kind of yield which occurs regularly (about once every five years) in the CPR and the last two had occurred in 1906 and 1911. They were caused by adverse meteorological factors, and with the given level of technology little could be done about them.

The low level of production in these years was consequently partly the consequence of a decline in sown area, although this may have been somewhat exaggerated, and partly the consequence of fairly normal fluctuations in the level of yield with a low point in the yield cycle hitting the CPR in 1917.

Although there have been attempts to make corrections to these data for their degree of under-estimation, these have all been fairly crude and have normally involved simply the addition of the same 9% 'Ivantsov' correction to the sown area data and yield data for all pre-revolutionary years up to and including 1917 without differentiating between the census and the TsSK data. Such a series of 'corrected' data as supplied by Groman is given below:

Grain production in the pre-1939 area of the USSR less Turkestan, Transcaucasia and the Far East.

	Production in mln.tons	Sown area in mln.hectare	Yield in tsentners per hectare
1909/13	75.1	91.2	8.2
1914	74.8	98.0	7.6
1915	82.8	95.3	8.7
1916	67.8	86.9	7.8
1917	65.3	87.2	7.5

Source: V.G.Groman, 'Khlebnaya produktsiya i khlebnyi eksport Rossii', in Entsiklopediya Russkogo Eksporta, Tom 1 Berlin 1924, pp.174-5.

I would suggest that Groman's corrected series of data cannot be accepted as having any known degree of reliability. The level of corrections applied to the pre-war data appears to me to be of unproven reliability and probably too high. There is no justification for using this same level of correction to the years when grain production was calculated in an entirely different manner and when it was probably subject to a different set of distorting influences. It does seem to me to be likely that a higher level of correction might well be required to the 1916 and 1917 sown area data than to the earlier TsSK data. The level of correction required might well be between 5 and 10%

e) Data on grain production by different types of producer

The available data on grain production by the different types of producer are not very satisfactory. Before the emancipation of the peasantry in 1861 the producers were grouped into three classes the pomeshchiki (hereditary landowners), serfs and [illegible] free peasants (called state peasants). After the abolition of serfdom, landownership was classified as being in one of several forms. Two forms that are of most relevance to us are private ownership (chastnovladelcheskoi) and peasant allotment communal ownership (nadelnaii). The communal ownership of peasant allotments sometimes went as far as to result in periodic repartition of land to be worked by the separate households, but generally it resulted in communal regulations over its general utilisation and regulations restricting its transfer and sale. The legal position as regards the sale of allotment land and the separation of individual households from the communal society (Selskoye obshchestvo or mir), which regulated general allotment land utilisation, had been changed by the Stolypin reforms of 1906. This allowed allotment land to be more easily converted into a form of privately owned land, but such a form of privately owned land was not included in the general statistics of private land ownership which tended to preserve the title chastnovladelcheskii only for that land which had never been classified as allotment land since the abolition of serfdom.

At first, immediately after the emancipation, the pomeshchiki had owned most of the chastnovladelcheskoi private land. But as time went on more land was sold to other groups, mainly the peasantry and members of other classes, the raznochintsy. By the first decade of the twentieth century the effective distinction between peasant allotment land and peasant privately owned land was becoming very slight. But TsSK continued

to account them separately and to make no distinction between peasant private land and pomeshchik private land. The landownership statistics, gathered at the time of a census of land utilisation and ownership, enable us to see the changes that were occurring within the category of privately owned land. See table below:

Regional ownership of land by type of producer in 39 Gubernii of European Russia in mln.hectares

		Peasant Allotments	Private Ownership Peasant	Other	All
NCR	1877	29.24	4.85	28.05	32.80
	1887	34.17	6.60	28.97	35.57
	1905	34.65	10.79	25.72	36.51
SPR	1877	21.90	0.58	21.96	22.54
Uk.	1887	22.28	3.01	20.46	23.47
	1905	22.00	6.23	16.30	22.53
CPR	1877	41.17	1.62	21.60	23.22
	1887	43.98	3.31	21.18	24.49
	1905	40.91	6.84	17.27	24.11
EPR	1877	13.36	0.08	9.20	9.28
	1887	16.50	0.17	9.78	9.95
	1905	17.55	0.24	10.34	10.58
USSR(39 G)	1877	105.66	7.14	80.78	87.92
	1887	116.94	13.08	80.31	93.39
	1905	115.13	24.12	69.60	93.72

Source: See the results of the 1877, 1887 and 1905 censuses as tabulated by N.D.Kondratiev (ed.) ibid., M.1923, pp.54-8.

These figures refer to total land ownership: pastureland and waste as well as arable land, sown land and land sown to grain. Generally, arable land accounted for a much larger share of the peasant allotment land and of the peasant private land than it did of other non-peasant private

land[1]. These figures indicate that overall the proportion of peasant ownership of private lands had increased from 8.1% in 1877 to over 25.7% in 1905. The relative share of arable land and of land sown to grain would have been much higher. This must be borne in mind when we are dealing with TsSK classifications of landownership. The 1916 census allows us to make a better distinction between the different types of private landowner. But for all the other data we must remember that after the emancipation a growing proportion of private land was being owned by the peasants.

In the following pages I will consider first the data on grain production by the different groups divided into private landowners and allotment owners, as made available in the studies of Nifontov and Kondratiev. Later I will consider the 1916 census data.

Nifontov offers us three series of figures. One series covers just the pre-emancipation decade and only 32 gubernii. A second series provides an indication of changes in the level of sowings for the different groups of producers in the three decades spanning the emancipation period i.e. from the 1850s to the 1870s. But these data only cover 29 gubernii. The final series covers grain production from the 1860s to the 1890s and sowings from the 1870s for the 50 gubernii of European Russia. From these figures the average yields by different types of producer can also be calculated.

Let us consider first Nifontov's data for the pre-emancipation period. Nifontov provides an indication of the net production (i.e. gross production less seed) for 32 gubernii[2] of European Russia for 1851-1860 with a

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1. The results of the 1917 census, which covered just 20 gubernii indicated that arable accounted for 36.6% of private land and 60.2% of peasant allotment land. (See Trudy TsSU, Tom V, vyp.I, M.1921, p.78.)

2. Nifontov actually provides data for 34 gubernii, but I have excluded two because later he supplies sowing data for only 32.

breakdown according to whether the production was on pomeshchik land, serf allotments or state peasant lands. These regrouped data are given below:

Grain production (net of seed) by sector in th.chetverts and million tons, for the average period 1851-1860

		Pomeshchik land	serf	state peasant	all lands
1. NCR (N15)	in th.chetverts	6.00	15.04	5.36	26.41
	in mln.tons	(0.76)	(1.90)	(0.68)	(3.33
3.SPR (N6)	in th.chetverts	7.60	7.51	4.84	19.94
	in mln.tons	(0.96)	(0.95)	(0.36)	(2.27)
4.CPR (N9)	in th.chetverts	12.01	14.64	13.70	14.34
	in mln.tons	(1.51)	(1.84)	(1.73)	(5.08)
5.EPR (N2)	in th.chetverts	0.08	1.41	9.72	11.20
	in mln.tons	(0.01)	(0.18)	(1.23)	(1.41)
USSR(N32)	in th.chetverts	25.68	38.60	33.61	97.89
	in mln.tons	(3.24)	(4.86)	(4.24)	(12.33)

Source: See A.S.Nifontov, Zernovoye proizvodstvo Rossii...., M.1974, p.129.

The share of the different sectors in the net grain production in the different regions and overall is indicated in the following table:

	Pomeshchik land	serf	state peasant	All lands
1.NCR (N15)	22.7%	57.0%	20.3%	100%
3.SPR (N6)	42.3%	41.7%	16.0%	100%
4.CPR (N9)	29.8%	36.7%	34.0%	100%
5.EPR (N2)	0.6%	12.6%	86.8%	100%
USSR (N32)	26.2%	39.4%	34.3%	100%

Data on sowings are available only for a few years 1852, 1856 and 1860 and these only cover the gentry and serf grain sowings. But if we assume that the overall regional grain yield rates for the full Nifontov regions apply to the 32 provinces given above, then it is possible to

calculate the sowings for all the land. If we further assume that the average of the 1852, 1856 and 1860 sowings data for the gentry and serf groups are typical of the decadal average then we can estimate the sowings and consequently the yields for the different sectors. These are given in the following table:

Grain production sowings and yields in 32 gubernii of European Russia in the 1850s

					Relative share in % of all			
	All land	Pomeshchik land	serf	state peasant	All land	Pomeshchik land	serf	state peasant
NCR(N15)								
Production	42.41	9.36	23.94	9.11	100	22.1	56.5	21.5
Sowings	16.00	3.36	8.90	3.74	100	21.0	55.6	23.4
Yield	2.65	2.78	2.69	2.43	100	10.49	10.15	91.7
SPR (N6)								
Production	27.41	10.57	10.35	6.49	100	38.6	37.7	23.7
Sowings	7.47	2.97	2.84	1.66	100	39.8	38.0	22.2
Yield	3.67	3.56	3.64	3.92	100	97.0	99.2	106.8
CPR(N9)								
Production	57.51	17.06	20.62	19.83	100	29.7	35.9	34.5
Sowings	17.17	5.05	5.99	6.13	100	29.4	34.9	35.7
Yield	3.35	3.38	3.44	3.23	100	100.9	102.7	96.4
EPR(N2)								
Production	15.67	0.10	1.95	13.63	100	0.7	12.4	87.0
Sowings	4.46	0.003	0.54	3.91	100	0.6	12.0	87.5
Yield	3.51	3.78	3.63	3.49	100	108.0	103.4	99.4
USSR(N32)								
Production	142.99	37.09	56.85	49.05	100	25.9	39.8	34.3
Sowings	45.10	11.4	18.26	15.44	100	25.3	40.5	34.2
Yield	3.17	3.25	3.11	3.18	100	102.5	98.1	100.3

Source: Calculated from A.S.Nifontov ibid., pp.103,120,129, see appendix.

Notes: Production and sowings are given in thousands of chetvert and yields in sam.

Production figures here refer to gross production, i.e. net production plus seed sown.

These figures indicate that overall the serfs produced the most grain, about 40%, the state peasants produced 34% and the pomeshchiki about 26%. Pomeshchik grain yields were about 2½% above the average. In the different regions there were considerable variations from this pattern. Serf grain production was much more important in the NCR accounting for almost 57%. It was least important in the EPR where the state peasants had the predominant position producing 87% of the grain. The pomeshchiki were most important in the SPR (the Ukraine) where they produced almost 39% of the grain, which was more than any other type of producer. They had, however, relatively low yields there.

Nifontov's second series of data covering grain sowings differentiated according to whether they were on private land or peasant allotment land, for the three decades spanning the emancipation period they are given in the following table: See over page.

These figures indicate the significant decline in the sowings on private land in the decade immediately after the emancipation. The relative share of private land sowings fell by over 1 million chetvert from just under 25% to just under 22% of all sowings. Overall they fell by 12.5%, the largest fall being 83.3% in the EPR, followed by a 17.3% decline in the CPR and a 15.4% decline in the NCR. In the Ukraine (SPR) the decline in private lands was only by 1.1%. The latter was the area where the pomeshchiki were most intent on organising their own large farms.

By the 1870s we see that the relative share of private landowner sowings had increased to 24.1%, almost the pre-emancipation level. But it would be a mistake to assume that this indicated an increase in pomeshchik sowings. As already explained above a growing proportion of non-pomeshchik representatives of the bourgeoisie and peasants were buying private land, and farming it. Most of these peasant increases in private land purchases

Grain sowings in mln.chetvert in 27 gubernii of European Russia 1850s - 1870s.

	1850s			1860s			1870s		
	All	Private	Allot.	All	Private	Allot.	All	Private	Allot
NCR(N12)	13.874	3.174	10.700	13.472	2.686	10.786	12.780	2.700	10.080
SPR(N6)	7.878	2.808	5.070	8.114	2.778	5.336	9.212	3.114	6.098
CPR(N7)	15.928	4.540	11.388	15.146	3.756	11.390	15.097	4.528	10.569
EPR(N2	4.954	0.024	4.930	5.552	0.004	5.548	5.800	0.006	5.794
USSR(N27)	42.634	10.546	32.088	42.204	9.224	33.060	43.075	10.393	32.682

(in %)

	1850s			1860s			1870s		
	All	Private	Allot.	All	Private	Allot	All	Private	Allot.
NCR(N12)	100	22.9	77.1	100	19.9	80.1	100	21.1	78.9
SPR(N6)	100	35.6	64.4	100	34.2	65.8	100	33.8	66.2
CPR(N7)	100	28.5	71.5	100	24.8	75.2	100	30.0	70.0
EPR(N7)	100	0.5	99.5	100	0.1	99.9	100	0.1	99.9
USSR(N27)	100	24.7	75.3	100	21.8	78.2	100	24.1	75.9

Source: A.S.Nifontov, ibid., pp.162,167.

were in the Southern part of the Ukraine and the lower Volga and these were the areas that began to show a remarkable increase in private land ownership.

The final series of producer differentiated data presented by Nifontov spans the period from the 1860s to the 1890s and its major outlines have been reproduced in the following table: see over page.

Here we see that although there was no real decline in the sowings on allotment lands, the sowings on private land was increasing far more rapidly. The proportion of sowings on private lands to all lands increased from 23.4% in the 1870s to over 27% by the 1890s. The yields on these private lands were consistently higher than the yields on allotment lands and the gap between their yields was rising: from 18% in the 1870s to 26.7% in the 1890s. Amongst the different regions the share of these private lands grain production were the highest in the SPR where they accounted for over 43% in the 1890s. In the CPR they accounted for about a third, but were still less than a quarter in the NCR and less than 5% in the EPR.

Unfortunately Nifontov's presentation of the data stops at the end of the 1890s. Much more data are available for the immediate pre-war years, although they have been little analysed. And much of them would involve a considerable amount of work before they were assembled in a form in which they could be readily analysed[1]. A general summary of the changes by type of

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1. For instance, Chetverikov has produced a 224 page compendium of the TsSK grain statistics for peasant allotment land covering all the grains and other major crops in all of the 56 gubernii of European Russia and the North Caucasus from 1883-1915. (See Svod urozhainyikh svedenii za gody 1883-1915, M.1928). It would be an extremely interesting task to compare these allotment land results with Obukhov's compendium of allotment plus private land results in order to look at the characteristics of these different groups throughout the whole period. Unfortunately, this cannot be done as the Chetverikov data are in a totally disaggregated state. The data for each of the 9 major grains in each of the 56 gubernii are given separately for each of these 32 separate years. Before these data are ready for comparison at least 16,000 arithmetic calculations would have to be made.

Grain production according to different types of producer in the 50 gubernii of European Russia from the 1860s to the 1890s

a)

	1860s			1870s			1880s			1890s		
	All	pri-vate	All-ot-ment	All	pri-vate	All-ot-ment	All	pri-vate	All-ot-ment	All	pri-vate	All-ot-ment
NCR(N)												
Production	6.42	1.29	5.13	6.72	1.41	5.31	7.67	1.77	5.90	8.60	2.10	6.50
Sown Area				2.11	0.39	1.72	2.15	0.44	1.71	2.18	0.47	1.71
Yield				3.18	3.62	3.08	3.57	4.02	3.44	3.94	4.45	3.80
SPR(N)												
Production	6.61	2.30	4.31	8.35	3.07	5.28	10.66	4.15	6.51	15.02	6.49	8.53
Sown Area				2.03	0.71	1.32	2.1	0.76	1.34	2.50	0.98	1.52
Yield				4.11	4.30	4.06	5.08	5.50	4.85	6.01	6.59	5.61
CPR(N)												
Production	11.98	2.74	9.24	12.88	3.46	9.62	14.12	4.65	9.47	14.49	4.81	9.68
Sown Area				3.12	0.75	2.37	3.19	0.92	2.27	2.97	0.86	2.11
Yield				4.13	4.62	3.97	4.43	5.04	4.18	4.88	5.63	4.59
EPR(N)												
Production	1.92	0.03	1.89	2.25	0.05	2.20	2.66	0.20	2.46	3.51	0.15	3.36
Sown Area				0.70	0.011	0.69	0.81	0.05	0.76	0.83	0.033	0.86
Yield				3.21	4.40	3.20	3.27	3.70	3.24	4.23	4.58	4.19
USSR(N)												
Production	26.93	6.36	20.57	30.20	7.99	22.21	35.11	10.77	24.34	41.62	13.55	28.07
Sown Area				7.96	1.86	6.10	8.25	2.17	6.08	8.48	2.34	6.14
Yield				3.79	4.30	3.64	4.26	4.96	4.00	4.91	5.79	4.57

b)

	1860s			1870s			1880s			1890s		
	All	pri-vate	All-ot-ment	All	private	All-ot-ment	All	pri-vate	All-ot-ment	All	pri-vate	All-ot-ment
Production												
NCR	100	20.1	79.9	100	21.0	79.0	100	23.1	7.69	100	24.4	75.6
SPR	100	34.8	65.2	100	36.8	63.2	100	38.9	61.1	100	43.2	56.8
CPR	100	22.9	77.1	100	26.9	73.1	100	32.9	67.1	100	33.2	66.8
EPR	100	1.6	98.4	100	2.2	97.8	100	7.5	92.5	100	4.3	95.7
USSR	100	23.6	76.4	100	26.5	73.5	100	30.7	69.3	100	32.6	67.4
Yield												
NCR				100	113.8	96.9	100	117.6	96.4	100	112.9	96.4
SPR				100	104.6	97.3	100	108.3	95.5	100	109.7	93.3
CPR				100	111.9	96.1	100	113.8	94.4	100	115.4	94.1
EPR				100	137.1	99.7	100	113.1	99.1	100	108.3	99.1
Sown Area												
NCR	100			100	18.5	81.5	100	20.5	79.5	100	21.6	78.4
SPR				100	35.0	65.0	100	36.2	63.8	100	39.2	60.8
CPR				100	24.0	76.0	100	28.8	71.2	100	29.0	71.0
EPR				100	1.6	98.4	100	6.2	93.8	100	4.0	96.0
USSR				100	23.4	76.6	100	26.3	73.7	100	27.6	72.4

Source: A.S.Nifontov, ibid., pp 192,237-7,278-9.

Note: a) Production in million tons, Sown area in million hectares
Yield in tsentners per hectare

b) in %

producer over this period has been presented by Kondratiev and I will have to make use of that, for this period, before completing the period with an account of the data in the 1916 agricultural census.

Kondratiev has indicated that the relative share of grain production from private lands continued to rise throughout this later period:

The level of grain production by different types of producer in 65 gubernii of Russia from 1893/7 and 1909/13 in mln.tons.

	Peasant allotment lands	Private lands	All	Peasant allotment lands	Private lands	All
1893/7	19.80	9.60	29.40	67.3%	32.7%	100%
1909/13	26.26	16.12	42.38	62.0%	38.0%	100%

Source: N.D.Kondratiev, Rynok khlebov..., M.1922, p.10

This was a consequence of both proportional increase in private land sowings and the continued proportional acceleration of yield increases on the private lands. Both of these points have been well illustrated by Kondratiev:

The proportion of sowings by different types of producers of the 4 main grains in the 65 gubernii of Russia

	Peasant allotment land	Private land
1896/1900	66.8%	33.2%
1906/10	65.3%	34.7%

Source: N.D.Kondratiev, ibid., p.9.

The level of grain yields for peasant and landowner lands in tsentners per hectare in the 65 gubernii of Russia

	Peasant allotment land	Private land	Private/ / allotment
1861/70	4.35	4.95	+13.7%
1871/80	4.65	5.55	+19.3%
1881/90	5.10	6.30	+23.4%
1891/1900	5.85	7.05	+20.4%
1901/10	6.45	8.09	+25.5%

Source: N.D.Kondratiev, ibid., p.6.

The war time data on grain production by different types of producer.

An analysis of the war time changes in production for the different types of producer is made complicated by the change in concepts involved. The 1916 census distinguished between peasant production and pomeshchik production without making any reference to the concepts of chastnovladel-cheskii or nadelnii land. A large share of the production that had earlier been classified as private was now transferred to the peasant category and the non peasant category became the narrow pomeshchik group, a mere 120,000 households as opposed to over 756,000 chastnovladelcheskii households[1]. The 1916 census figures are consequently not at all comparable with the earlier figures dividing the producers into different groups. This is not always realised and even the most eminent historian of the period appears in a momentary relapse to have attempted to compare these data. Kondratiev provided the following surprising indication of the war time change in level of grain sowings for different types of producer:

	Peasant lands	private landowners
1909/13	100	100
1914	107.1	103.3
1915	121.2	50.3

Source: N.D.Kondratiev, Rynok khlebov..., M.1922, p.40

Kondratiev failed to provide the actual figures from which these index numbers were calculated, and failed to specify precisely the source of these data. But all the circumstantial evidence is that the 1915 private land-owners figure refers not to chastnovladelcheskii land but only to Pomeshchik land, and that it was calculated from the returns of the 1916 census and

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1. There were registered to be 756,376 households in the group of all private land owners in just 42 gubernii of European Russia in 1905 (See N.D.Kondratiev, (ed.), ibid., M.1923, p.71). So there would have been many more in all the area of Russia a decade later.

not from TsSK data[1].

This 53% drop in size of private landowners sowings in just one year is primarily a consequence of using incomparable statistical indicators. Anfimov has used the unpublished materials of the 1916 census and other data for the war time years and has made a revised estimate of the war time changes in the area sown by pomeshchiki and peasants assuming the 1916 census definitions. This dynamic is presented below:

Sown area in million hectares

	All Grains			Food Grains			Feed Grains		
	All	Peas-ant	Pomesh chik	All	Peas-ant	Pomesh-chik	All	Peas-ant	Pomesh chik
1914	93.68	84.49	9.20	64.17	57.71	6.46	29.51	26.78	2.74
1915	90.06	81.21	8.85	62.68	56.37	6.31	27.38	24.84	2.54
1916	82.97	75.73	7.25	56.55	52.07	4.48	26.42	23.65	2.77
Relative share									
1914	100	90.2	9.8	100	89.9	10.1	100	90.7	9.3
1915	100	90.2	9.8	100	89.9	10.1	100	90.7	9.3
1916	100	91.3	8.7	100	92.1	7.9	100	89.5	10.5

Source: Calculated from A.M. Anfimov, ibid., M.1962, p.280

It is clear from my calculations of the relative share of each type of producer that Anfimov has just applied the 1915 proportions that he received from the 1916 census, to the data for 1914. This seems to be a fairly reasonable procedure and there appears to be no alternative. Overall the 1914 sown area was no less than the 1913 sown area so the 1916 level of pomeshchik sowings was probably no lower than 78.8% of its pre-war level in 1916 when the level of peasant sown area in 1916 was just

1. The 1916 census had asked the producers to provide an indication of their sowings in the previous year, and these results for 1915 will be considered by us later in this section. Kondratiev certainly had access to all the returns of the 1916 census, as he was a deputy minister of agriculture at the time that the results were being calculated.

under 90% of its pre-war level.

It should be noted that these figures for the relative share of pomeshchik sown area are totally compatible with the pre-war figures for pomeshchik production given by Stalin in 1928.

Stalin gave the following breakdown of pre-war grain production according to different types of producer:

	Grain production in mln. tons	in %%
Pomeshchiki	9.8	12.0%
Kulaki	31.1	38.0%
Serednyaki & Bednyaki	41.0	50.0%
All	81.9	100%

Source: I.Stalin, Sochineniya, Tom.11, M.1949, p.85.

The figure that the pomeshchiki produced 12% of all the grain is the level that we would have expected if we accept a) the 1916 proportions of the pomeshchiki sowing 10% of all grain and b) the pre-war proportions of landowner households having a level of grain yield about 20% higher than peasant allotment households. The justification for the division between kulaki and other peasants is harder to justify, but it appears to be a very rough estimation based on allowing the serednyaki and bednyaki to produce half the grain in the country.

Before leaving Anfimov's table of 1914-16 grain sown area, we should also note the distinct differences between the sown areas for food grains and feed grains. During this period of gentle overall decline the pomeshchiki actually increased their sowings of feed grains. This was probably associated with them providing for the fodder needs of the army.

In the peasant sector the sowings of feed grains fell more sharply than for food grains.

An indication of the regional distribution of pomeshchik and peasant sowings from the 1916 census data are provided in the following table:

The regional distribution of grain sowings by type of producer in mln.hectare for the pre-1939 area of the USSR in 1916

	NCR	SCR	SPR	CPR	EPR	USSR
Pomeshchiki	0.7	0.1	3.8	1.9	0.1	6.5
Peasants	11.4	2.9	23.9	26.4	15.9	80.6
All	12.1	3.0	27.7	28.3	16.0	87.1
% Pomeshchik to all	5.8%	3.3%	13.7%	6.7%	0.6%	7.5%

Source: A.Gayster (ed.), ibid., M.1930, pp.14-22.

Here we see that the SPR remained the major area of pomeshchik farming and that they still covered almost 14% of the land sown to grain. The EPR also remained the area with the lowest share of pomeshchik land.

Turning now to the war time data on grain production and grain yields we note the following indication of the changes in war time production for pomeshchiki and peasants as calculated by Anfimov: (See over page)

Again ignoring the high level of these figures, and just looking at their comparative values, we see that the pomeshchik estates maintained a level of yield some 20% higher than on the peasant allotments.

Finally in this section I will briefly introduce the more detailed data on pomeshchik grain sown area for 1916 that Anfimov has made available. The history and sources of these data have already been discussed above .

Grain production by peasant and pomeshchik households 1913-1917 in mln.tons

	All grain			Food grains			Feed grains		
	All	Peasant	Pomesh-chiki	All	Peasant	Pomesh-chiki	All	Peasant	Pomesh-chiki
1913	89.25	(78.99)	(10.26)						
1914	76.49	67.68	8.81	52.09	45.93	6.16	24.41	21.75	2.65
1915	78.62	69.47	9.15	54.87	48.32	6.55	23.75	21.15	2.60
1916	65.00	58.25	6.75	43.37	39.33	4.05	21.62	18.92	2.70
1917	59.18	54.31	4.87	37.35	34.67	2.88	21.61	19.64	1.29
1913	100	(88.5)	(11.5)						
1914	100	88.5	11.5	100	88.2	11.8	100	89.1	10.9
1915	100	88.4	11.6	100	88.1	11.9	100	89.1	10.9
1916	100	89.6	10.4	100	90.7	9.3	100	87.5	12.5
1917	100	91.8	9.2	100	92.3	7.7	100	90.9	9.1

Sources: 1913-16, A.M.Anfimov, ibid., M.1962, pp.293, 296.

1917 A.M.Anfimov, ibid., M.1969, p.220

Note: The data for 1913-16 cover the area of 65 gubernii of Russian Empire. The data for 1917 cover the pre-1939 area of the USSR.

For the 1917 data I have grouped millet and buckwheat together with the food grains as this appears to be most appropriate for comparability with the 1913-16 data.

The sown area and specific grain sown area for the 84,183 pomeshchik households included in the 1916 census results are indicated in the following table:

Type of pomeshchik household according to area sown.

	No sowings	0-10 des.	10-50 des.	50-100 des.	100-250 des.	250-500 des.	500-1000 des.	1000-5000 des.	5000+ des.	ALL
No.of hseholds	7970	16463	28275	14065	10286	4411	2020	682	11	84,184
households supplying data for 1915 & 1916	765	14191	25809	13027	9568	4004	1952	640	11	70,057
All sown area in mln.ha.(1)										
1915	0.120	0.118	0.949	1.165	2.653	1.789	1.505	1.179	0.082	8.959
1916	0.001	0.072	0.780	1.011	1.636	1.687	1.447	1.152	0.077	7.863
change in sown area in %		-77%	-17.1%	-13.2%	-20.3%	-5.7%	-3.8%	-2.3%	-62%	-12.2%
All sown area in mln.ha.(2)		0.072	0.720	0.866	1.636	1.686	1.447	1.152	6.077	7.660
All grains sown as % of all sown area		0.054	0.595	0.745	1.374	1.360	1.123	0.855	0.053	6.16
		74.4%	82.6%	86.0%	84.0%	80.7%	77.6%	74.2%	70.9%	80.4%
Sown area by grain as % of all sown area										
Winter Rye		29.7	25.8	20.3	20.6	16.5	13.5	13.4	14.9	17.9
Spring Rye		0.5	0.3	0.3	0.9	0.1	0.1	0.1	0.2	0.2
Winter Wheat		3.0	7.8	12.2	14.1	19.3	21.4	17.2	11.7	15.9
Spring Wheat		3.5	11.1	14.3	9.6	7.9	8.8	13.2	16.2	10.4
All food grains		36.7	47.1	47.1	45.2	43.8	43.8	43.9	43.0	44.4
Oats		26.8	22.1	18.4	21.2	21.4	19.6	16.6	16.5	20.0
Barley		6.6	10.2	16.1	13.4	10.4	8.7	8.9	5.5	11.2
Millet		1.5	1.8	1.8	2.0	2.7	3.2	3.3	5.0	2.5
Buckwheat		2.2	1.2	1.2	1.2	1.1	0.9	0.6	0	1.1
Maize		0.4	1.2	1.4	1.4	1.0	1.3	1.4	0.9	1.2
All non-food grains		37.7	38.9	38.8	38.8	36.9	33.8	30.3	27.9	36.0
grain sown area per household		3.28	21.04	53.0	133.6	308.3	555.9	1253.6	5000	91.00

Source: 1. A.M.Anfimov, ibid., M.1962, p.138.
2. A.M.Anfimov, ibid., M.1969, pp.206-7

Note: No explanation is given for the slight difference in the 10-50 and 50-100 des. group figures for sown area.

The average pomeshchik household sowed grain on 91 hectares, by comparison with an average grain sown area for the peasantry of 3.83 hectares[1]. But probably as many as 25% of the pomeshchik households sowed less grain than this (9% are classified as having no sowings, and almost 20% sowed less than 10 desyatiny and had an average level of grain sowings of 3.3 hectares. The distribution of grain sowings amongst the pomeshchik households is therefore remarkably skewed with a small number of very large estates and a large number of small ones.

It is interesting to note the change in distribution of crops and grains in the different sized households. In general the pomeshchik households sowed much less rye than the peasants and the proportion of rye fell as the size of farm increased. But this might just be a reflection of the regional location of the large estates. Since most of the large estates were in the Ukraine we would expect them to have a larger proportion of wheat grown than of rye. The increase in sowings of millet in the larger farms is probably a reflection of their production for their own hired labourers.

In this section no attempt has been made to make an analysis of peasant households according to the size of their sown area or on any other socio-economic criteria. No data are available on a sufficiently large scale to make this possible. Some attempts were made to classify the population into separate groups in separate areas. But these attempts are so different and so scattered that it is impossible to aggregate them.

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1. See A.Gayster, (ed.), ibid., M.1930, pp.5, 14.

5. Grain utilisation balances before the Revolution

In this final chapter to part one of this thesis I review all the available grain utilisation balances that have been constructed for this period. In section a) which covers general undifferentiated balances, I present the balances in chronological order according to the period they cover. But in the sections covering the more detailed balances I present the data in a chronological order according to the period when the balance was constructed. The more detailed sections are concerned with b) the regional breakdown of the balances, c) the breakdown according to different types of producer.

a) The available general undifferentiated balances of grain utilisation

The balances in this section will be discussed very briefly. The number of general undifferentiated balances is very large. Generally they are of little value other than as a summary of more detailed balances. Those balances which are a summary of more detailed balances will be dealt with in more detail in the appropriate section. Those balances that are not based on more detailed balances need not waste much of our time. Some of the undifferentiated balances are useful as a general illustrative indication of what the overall situation is believed to have been. These balances should be treated as hypotheses. Other balances were proposed in order to demonstrate the feasibility or non-feasibility of the production data. These have to be treated very carefully to see whether the balance is purely cosmetic or whether it is genuine. The cosmetic balances fall to pieces when they are analysed in detail, whereas the genuine balance reveals itself as consistent in all its details.

This section is primarily, therefore, an introduction to the different types of balances, an indication of the hypotheses of what the long-term trend has been and an introduction to some of the politically significant balances.

Very rough indications of the long term changes in grain utilisation are available in Strumilin's 'illustrative estimation' covering the third to the twentieth century, that has already been described above, and in the Mikhailovsky/Fortunatov series of returns to seed yield for the whole of the nineteenth century. These indicate the very large share of grain required as seed, given the very low yield to seed ratio that existed in the past[1].

A more detailed indication of long term changes in grain utilisation was produced by P.I.Popov in 1925[2]. Popov's grain forage balances are presented below:

	1840/50	1850/60	1912/13
Production	28.3	27.8	72.8
Rural Consumption			
Seed	7.9	7.9	11.7
Food	18.7	19.8	27.4
Feed			11.1
All Rural	26.6	27.7	50.2
Extra Rural Consumption			
Urban Population			
Food	1.4	1.5	5.1
Feed			1.1
All Urban	1.4	1.5	6.2
Army	0.7	0.7	0.8
Industry	0.7	1.1	0.4
Export	0.4	1.1	10.7
All Extra Rural	3.2	4.4	18.1
All Consumption	29.8	32.1	68.2
(Correction coefficient)	+5.5%	+15.4%	-6.2%

1. See Strumilin's estimation p.185 above

2. See P.I.Popov, 'Khlebo-furazhnyi balans 1840-1924', in Selskoye Khozyaistvo na putyakh vosstanovleniya, M.1925, pp.1-50.

Sources: P.I.Popov, ibid., p.37.

Notes: 1840-50, 1851-60: refer to European part of Russia, 1912/13, 1923/24 and 1924/25 refer to pre-1939 area of USSR.

Data were initially given in puds and have been converted into millions of tons.

The correction coefficient would appear to refer to changes in stock and losses as well as to corrections for under recording. (See P.I.Popov, ibid., p. 9)

It was not clearly specified whether the 1840/50, 1850/60 figures included potatoes, but it is assumed that they did.

In his article Popov explains that the 1840/50, 1850/60 figures were based on the calculations made by Keppen, Protopopov, Tengoborskii, Vilson and Semyonov in the middle of the nineteenth century. Of these early balances the only one which will be dealt with in more detail is the Vilson one[1]. The consumption norms were based upon military ratios and odd budget studies, the revizii were used for population data. Grain production and seed data come from the annual Governor's accounts. Export data and industrial accounts come from the appropriate government offices. Popov argues that the figures used in the mid nineteenth century by many contemporary writers under-estimated the real size of consumption. The population data were too low and much of the other data were selected for exceptionally good years when grain was relatively abundant instead of the average of all years. Popov's criticisms of these earlier data would indicate that there was no over-production of grain in the pre-emancipation years as was commonly claimed[2].

Recent works analysing this question have tended to agree with Popov, although they have somewhat revised his figures[3].

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1. See below p.252
2. See P.I.Popov, ibid., pp.1-12.
3. See I.D.Kovalchenko, Russkoe krepostnove krestyanstvo v pervoi polovinve XIXv., M.1969, p.97, A.S.Nifontov, Zernovoye proizvodstvo Rossii vo vtoroi polovinve XIX veka, M.1974, pp.138-43, and T.M.Khitanina, Khlebnaya torgovlya Rossii v 1875-1914gg., L.1978, pp.40-1.

Kovalchenko has produced an indication of what he believes the level of extra-rural grain consumption to have been in European Russia in the 1850s[1]. This can be combined with his indications of the level of production and sowings in European Russia at the same time in order to construct his implicit grain forage balance. The implicit Kovalchenko grain forage balance for European Russia in the 1850s is given in the table below:

	Grain in mln. chetvert	Grain in mln.tons approx.	Grain in %%
Grain Production	198.6	25.0	100%
Utilisation			
Rural			
Seed	62.5	7.9	32%
Food and Feed	98.2	12.4	50%
All Agricultural Consumption	160.7	20.2	84%
Extra agriculture	37.9	4.8	19%
Urban population (6.1 mln x 2 chet)	12.2	1.5	6%
Industrial population of North, North-West and Industrial Centre (3.53 mln. x 1.5 chet.)	5.3	0.7	3%
Industrial population other regions (1.8 mln. x 1.5 chet.)	2.7	0.3	1%
Army (0.65mln.x 3 chet.)	1.95	0.2	1%
Distillation	8.00	1.0	4%
Export	7.7	1.0	4%
All extra agriculture	37.9	4.8	19%

Sources: I.D.Kovalchenko, ibid., pp.97, 386

Notes: The volume measurements have been converted into their approximate weight value, using the following conversion 1 chetvert = 0.126 tons.

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1. I.D.Kovalchenko, ibid., p.97.

In his book Kovalchenko also produced a partial breakdown by producer and by region for the production data and for the commodity part. I will return to these later.

The series given below are the calculations of grain utilisation in the middle of the nineteenth century and its changes in the second half of the nineteenth century as supplied by the Soviet historian A.S.Nifontov:

The production and utilisation of grain and potatoes in the 50 gubernii of European Russia 1850-1900 in millions of tons

	1850s	1860s	1870s	1880s	1890s
Production	26.3	27.9	32.0	37.5	45.8
Rural consumption					
Seed	8.2	8.1	8.7	9.1	9.6
Food and forage	16.0	17.1	18.6	22.2	25.4
All Rural	24.2	25.2	27.3	31.3	35.0
Extra Rural Consumpton					
Urban	1.6	1.8	2.2	2.8	3.4
Army	0.6	0.6	0.6	0.6	0.7
Industry	1.0	1.0	1.1	1.2	1.3
Export	1.0	1.5	3.6	5.4	6.3
All Extra Rural	4.1	4.9	7.5	10.0	11.7
All Consumption	28.4	30.1	34.8	41.3	46.7
Residual	2.1	2.2	2.8	3.8	0.9
Residual as % of Production)	(+8.0%)	(+7.9%)	(+8.8%)	(+10.1%)	(+2.0%)
Rural purchases	1.2/1.5	1.9/2.5	3.1	3.7	4.4
All Commodity part	5.3/5.6	6.8/7.4	10.6	13.7	16.1

Sources: A.S.Nifontov, Zernovoye Proizvodstvo Rossii vo vtoroi polovinve XIX veka, M.1974, pp.143,211,214,307,310, (198,284).

Notes: The data were given in volume equivalents (mlns.of chetvert) The conversion of volume measures into weight measures is sensitive to changes in the kind of grain. But as Nifontov has only supplied us with the utilisation balance in aggregate terms (although with potatoes converted to their rye equivalent) there is no alternative but to use a rough general conversion coefficient for all the data. The conversion coefficient used was 1 chetvert = 0.125 tons. (See Nifontov, ibid.,pp.169-70). 3 chetverts of potatoes = 1 chetvert rye (Nifontov, ibid., p.205).

Notes cont'd:

> The grain equivalent of the potatoes included in the above balances was 0.5 mln.tons in 1850s; 0.7 mln.tons in 1860s; 1.3 mln.tons in 1870s; 1.7 mln.tons in 1880s and 3.5 mln. tons in 1890s.
>
> The population figures which these consumption patterns apply to are: 1850s 59.3 mln; 1860s 63.7 mln; 1870s 69.8 mln; 1880s 81.7 mln; 1890s 94.2 mln.

In this balance the major items in rural consumption have been calculated by means of using an average norm of consumption for personal food and livestock feed per head of the population and applying it directly to the population data. All other items come from fairly firm data. Changes in the level of residual should therefore indicate changes either in the level of unreliability of the production data or more likely, in this case, changes in the average level of consumption norms. During the period from the 1850s to the 1880s the residual had a value which fluctuated between 13% and 17% of the level of rural food and forage consumption. In the 1890s the level of the residual fell by more than 10 percentage points to 3.5% of the average level of rural food and forage consumption. This is a very sharp fall, (in absolute terms it was a fall of almost 3 million tons, over 8% of gross production), and I would suggest that it is possibly indicative of up to a 10% fall in the average food and feed consumption norm. The famine of 1892/93 certainly resulted in a decline in livestock numbers[1] and a fairly severe demographic shock, so it is quite likely to have had some effect on average consumption levels and livestock feed per head of population levels. As mentioned above this decline would have come in the early 1890s and we would have expected it to have been masked by the better years of the 1890s. But this very sharp decline in the level of residual does take place and there seems to be no other explanation for it.

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1. See below p. 276-6

These Nifontov data are also given in great detail as regards regional breakdown and breakdown according to producer for the 1850s. We will consequently return to these data again in the later sections of this chapter.

A fairly detailed balance according to types of grain and types of producer was produced by P.I.Lyashchenko for 1901-5 in the decade before the Revolution and this will be discussed in more detail in the later sections.

A considerable number of 1909/13 and 1913 balances have been constructed at different times. Most of them are cosmetic balances. The most substantial 1909/13 balance was the one constructed by Kondratiev in the early 1920s. This unfortunately only covered the main producer regions and so can not easily be compared with the general balances described in this section. The Kondratiev balance provides a regional breakdown within the main producer regions, a breakdown according to grain type for the four main grains and a breakdown according to type of producer. It will consequently be dealt with in the later sections.

All other balances for 1909/13 and 1913 are summarised in the following table: see over page.

Both the Popov and Nifontov series referred to above were based on uncorrected production data and consumption data with constant norms. But some of the balances included in this table (all of the balances after column 3) contain quite substantial corrections to the grain production data. These inflated Gosplan balances played a very significant role in providing the justification for a series of large corrections which were subsequently made to pre and post revolutionary grain production data. But these Gosplan balances are all, without exception, cosmetic balances. None are given with any regional breakdown or with any breakdown for separate grains.

Pre-war Grain forage balances, from various sources, in mln.tons.

	TsSU Popov 1921 (pre-war)	NKZ Zem-plan 1924 1911-15	TsSU Popov 1925 1912/13	SES Adelung 1925 1906/14 prewar border	SES Adelung 1925 1913 1923 border	Gosplan Vishnevsky 1925 1913	Gosplan Vishnevsky 1926 1913/14	Gosplan Vishnevsky 1926 1908/14	OSVOK 1909/13	OSVOK 1913	Prok-opo-vich 1931 1913	Jasny 1909/10/13/14	Anfimov 1962 1913/14
	1	2	3	4a	4b	5a	6a	6b	7a	7b	8	9	10
Gross prodn.	68.30-81.24	67.65	72.78	84.09	82.94	93.20	93.20	75.30	82.54	89.25	81.24	81.9	89.25
Utilisation													
Rural seed	9.01-10.65		11.68	13.55	14.27	1427	14.33	13.10			13.10	14.14	12.12
feed	11.47-13.10		11.11(+1.05)	15.68	18.22	16.43(+1.41)	17.36(+1.41)	13.10(+1.20)	63.57	71.12	48.48	19.33	20.02
personal	32.76-36.86		27.44		32.91	32.91	33.01	29.80				35.05	37.80
All rural	53.24 60.61	42.42	50.23(+1.05)	43.82	65.40	63.61(+1.41)	64.70(+1.41)	56.00(+1.20)	63.57	71.12	61.58	68.52	69.94
Urban	3.28- 4.91		5.13		6.52	6.52	5.34	5.00	6.81	7.31			6.44
Industrial	1.31- 1.64	16.87	0.36	1.02	0.78	0.79	0.82	0.70	0.72	1.02	9.62	0.51	0.95
Army	0.66- 0.98		0.82	0.63	0.48	0.87	0.90	0.80	-	-		-	1.40
Main consumption balance	58.49-68.14	59.29	56.54(+1.05)	45.47	73.18	71.79(+1.41)	71.76(+1.41)	62.5(+1.20)	71.10	79.45	71.20	69.03	78.73
Exports	9.83-13.10	8.52	10.66	9.17	9.77	13.05	13.05	10.60	11.43	9.81	10.06	10.60	10.52
Stock change				+0.19		+6.99	+6.99	+1.00			+3.01		

Sources for pre-war grain forage balances:

1. P.I.Popov, Proizvodstvo khleba v RSFSR i federiruyushchikhsya s neyu respublikakh, M.1921, pp.19-21

2. N.D.Kondratiev and N.P.Oganovsky (eds.), Perspektivy razvitiya selskogo khozyaistva SSSR, M.1924,

3. P.I.Popov, 'Khlebo-furazhnyi balans 1840-1924', in Selskoye khozyaistvo na putyakh vosstanovleniya, M.1925, p.37.

4. N.Adelung, 'Dovoennoe selsko-khozyaistvennoe proizvodstvo,' in Plan.Khoz., 1925, No.11, p.309

5. Kontrolniye tsifry narodnogo khozyaistva na 1925/26g. M.1925, pp.74-5.

6. N.M.Vishnevsky, 'Balans khlebo-furazhnyi', in BSE, Tom iv, M.1926, pp.478-9.

7. N.P.Oganovsky, N.M.Vishnevsky and A.E.Lositsky (eds.), 'Perspektivy razvitiya selskogo khozyaistva', Materialy osobogo soveshchaniya po vosstanovleniyu osnovnogo kapitala pri Prezidiume VSNKh SSSR, series III, vol.II, M.1927, p.86.

8. S.M.Prokopovich, 'The communist policy towards the peasant and the food crisis in the USSR', Birmingham Bureau Memorandum, No.8, 1932 (appendix).

9. N.Jasny, The socialized agriculture of the USSR, Stanford, 1949, Appendix, Note J.p.751.

10. A.M.Anfimov, Rossiiskaya derevnya v gody pervoi mirovoi voiny, M.1962, p.303.

This is because none are based on any detailed data, they were just constructed from all union data with the object of justifying a large all union level of correction[1].

The major wartime balance was the preliminary planning balance for 1917 that was constructed by A.E.Lositsky in the autumn of 1917 i.e. before the completion of the harvest year that it refers to. This balance was therefore more of a planning projection than an account of an accomplished task. Nevertheless it was based on a wealth of analysis of the available data on consumption patterns and was presented in great detail with a breakdown according to different regions and to different grains. This was a preliminary balance, but it was no cosmetic balance. It will consequently be dealt with in some detail in the later sections. Lositsky's 1917/18 balance has served as the basis for the calculation of many other balances. Kondratiev used it in the construction of his 1909/13 balance, it was no doubt much used by Gosplan in their construction of pre-war balances and it has also been used by modern Soviet historians.

In his classic account of the Russian countryside during the First World War, A.M.Anfimov has used the Lositsky balance in order to construct a series of grain balances for the wartime years. These balances are reproduced below in comparison with the original Lositsky balance for 1917/18:

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1. For an account of the circumstances in which these corrections were made to the pre-revolutionary data, see S.G.Wheatcroft, Soviet Studies, April 1974, pp.158-80.

	1913/14	1914/15	1915/16	1916/17	Lositsky 1917/18
Production	89.3	76.3	78.6	65.0	59.2
Rural consumption					
Seed	12.1	11.9	11.2	10.4	11.2
Feed	20.0	16.9	16.6	16.2	16.4
Food and stocks	37.8	35.7	34.9	25.3	24.1
All Rural	69.9	64.5	62.7	51.9	51.8
Extra Rural Consumption					
Urban population	6.4	5.9	5.4	4.8	4.3
Army	1.4	5.2	9.8	8.0	-
Industry	1.0	0.4	0.2	0.2	-
Export	10.5	0.5	0.7	-	-
All Extra Rural	19.3	12.0	16.0	13.0	7.4

Source: A.M.Anfimov, Rossiiskaya derevnya v gody pervoi mirovoi voiny, M.1962, p.294, and A.E.Lositsky Urozhai khlebov v Rossii v 1917g., M.1917, pp.29, 46-7.

Note: In mln Cons.

Anfimov has made two alterations to the Lositsky balance, he has inflated the overall production figures by at least 9% (about 6 million tons) and he has included a large allocation for the army 8 million tons in 1916/17. These are unjustifiable corrections.

First, as explained above[1] the army are included in Lositsky's balance and are located amongst the rural population data. This is apparent from an analysis of the population data that Lositsky was using and apart from which it is inconceivable that such a major item as the supplies required for the army would be left out of the balance. As explained above, the whole rationale for the zemstvo statistiticans being allowed to get together was to plan supplies for the army and urban population and Lositsky just could not have forgotten to supply the army[2]. The inclusion of the

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1. See p. 4-6

2. There are also good reasons in connection with national security why Lositsky should not have been too explicit about explaining the location and number of troops, in a published document while the country was at war.

army as a separate item consequently amounts to counting it twice, this would lead to the consumption side of the balance being 8 million tons too high. The removal of this 8 million tons would also necessitate the removal of the correction to the gross production figure. I repeat that none of these balances appear to offer any substantial justification for the application of a large correction to the production data, and all the detailed non-cosmetic balances exclude major corrections. We will now turn to the more detailed analysis of the more detailed balances.

b) Available regional grain utilisation balances

In this section I will consider four regional grain forage balances in chronological order according to the year in which the balance was constructed. The first i) covers the years 1857/63 and was constructed in 1869 by I.Vilson[1], the senior statistician in the Department of Agriculture of the Ministry of State Property. The second ii) covers the years 1917/18 and was constructed in the autumn of 1917 by A.E.Lositsky[2], the director of the statistical economics department of the Ministry of Food. It should be noted that this balance was drawn up well before the completion of the year that it covers and that it was intended to serve operational planning purposes. This was the only pre-revolutionary balance that had such an aim, all the other pre-revolutionary balances that I will describe served a more traditional historical orientational role. The third balance iii) covers the period 1909/13 and was constructed in 1918 and 1919 by N.D.Kondratiev[3]. It was initially written as part of a larger work entitled 'Materials on the regulation of the economy during the war and revolution' that was to be edited by S.N.Prokopovich. Kondratiev had been a deputy minister of Food Supply in the provisional government[4], and Prokopovich had been president of the provisional government's Supreme Council of the National Economy (VSNKh)[5].

The final regional balances that I will consider are the series of balances covering the period from the 1850s to the 1890s, which were constructed by the modern Soviet historian A.S.Nifontov[6].

1. See I.Vilson (compiler) Obyasneniya k khozyaistvenno-statisticheskomu atlasu Evropyeiskoi Rossii, 4th edition, SPb.,1869,pp.106-13. The balance cited here appeared in the fourth edition which appeared in 1869. The first edition appeared in 1851, but I have not been able to consult this or any of the earlier editions.
2. A.E.Lositsky, Urozhai khlebov v Rossii v 1917 godu, valovoi i chistii sbor, prodovolstvenniye i kormoviye potrebnosti, mestniye izbyitki i nedostatki glavnyikh khlebov, M.1918
3. N.D.Kondratiev,Rynok khlebov i ego regulirovaniye vo vremya voiny i revolyutsii, M.1922, Appendix 2, pp.204-23.
4. See N.Jasny, Soviet Economists of the Twenties,names to be remembered, Cambridge,1972,p.158.
5. See N.Jasny, ibid.,Cambridge,1972, p.99.
6. See A.S.Nifontov, Zernovove proizvodstvo Rossii..., M.1974.

i) Vilson's regional grain forage balance 1857/63

This grain forage balance covered 49 provinces of European Russia and provided data on the production and utilisation of the winter grains (winter wheat and winter rye), the spring grains (spring wheat, oats,barley, millet, buckwheat) and potatoes. The quantities were given in volumes and have been converted into weight measurements using a very crude undifferentiated conversion coefficient (1 chetvert = 0.126 tons). And the regions have been regrouped into one major consumer region (NCR) and three major producer regions (SPR,CPR, and EPR)[1].

The population data are based on the revizii. The grain production data , data on seed rates and livestock numbers are all based on the annual reports of the local officials as passed to KNP. The quantity of grain used as food was calculated by mutiplying the regional population data with an overall average per capita grain consumption norm of 0.277 tons per head (0.252 tons of winter grains, i.e. 2 chetverts, and 0.025 tons of spring grains i.e. 0.2 chetverts) according to Solovyev's recommended norm[2]. The quantity of grain used as livestock feed was also based on Solovyev's recommended levels of 0.23 tons per year per horse (i.e. $2\frac{1}{2}$ chetverts of oats)[3]. The quantity of grain used for industrial purposes was calculated from the official statistics of the taxation department on the quantity of grain, flour, malt and potatoes used in the distillery and brewing industries .

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1. For further details of the regionalisation and the basic data see the appendix. Basically the regionalisation used here has been chosen to be comparable with the later Lositsky data for 1917.
2. See above p.100
3. See above p.138

Vilson's balance is presented in the following table (see table on following page). In this table we see that the NCR is the only region with an average deficit. It has an average deficit of 0.73 tons per year, i.e. 0.043 tons per head per year, about 9.2% of the quantity of grain actually produced in this region. All other regions produced surpluses. The largest surplus 3.32 tons per year was produced in the CPR, this was a surplus of 0.160 tons per head of the population of the CPR and represented 21.6% of all the grain produced in the CPR. The next largest surplus producer was the Ukraine (SPR) which produced a surplus of 1.63 million tons, 0.104 tons per head of the population 18.4% of all the grain produced in the CPR. Finally there was the Urals (EPR) which produced a surplus of just 0.11 tons per year, 0.026 tons per head which was 4.5% of the grain produced in the EPR.

Overall therefore we see a surplus of 4.38 million tons, 0.074 tons per head of the population, 12.3% of all production. Of this sum 1.15 million tons was exported leaving a balance of 3.23 million tons, i.e. 0.053 tons per head of all the population or 8.8% of total production. Concerning this final surplus, Vilson stated that this quantity of grain 'remained as stocks, and it is equal to about one seventh of the peasant's annual food and forage consumption of grain: in other words, seven years of average harvests could provide the population with enough grain for food and forage to withstand one year of complete harvest failure'.[1]

This balance undoubtedly suffers from the crude manner in which its volume measurements have been converted into weight measurements, from the crude uniform food consumption and livestock feed norm. The treatment of stock adjustments and Vilson's comments on this matter are also somewhat

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1. I.Vilson, (compiler), ibid., SPb.1869, pp.112-13.

The regional grain forage balance for 1857/63 in mln.tons (approximate conversion)

Region	Popul-ation	Produc-tion	Utilisation Seed	Feed	Food	Ind.	All	Balance	Consumption norms in tons per head of population per year food	feed	food & feed
NCR	16.98	7.94	2.55	1.13	4.71	0.28	8.67	-0.73	0.277	0.067	0.344
SPR											
a)Ukraine	15.62	8.84	1.78	0.75	4 33	0.35	7.21	+1.63	0.277	0.048	0.325
CPR											
a)Tsent.Zeml.	9.87	7.29	1.71	1.36	2.73	0.20	6.00	+1.29	0.277	0.137	0.414
b)Volga	10.87	8.08	1.61	1.22	3.02	0.20	6.05	+2.03	0.277	0.112	0.389
All CPR	20.74	15.37	3.32	2.58	5.75	0.40	12.05	+3.32	0.277	0.124	0.401
EPR											
a)Urals	4.36	2.51	0.75	0.39	1.21	0.05	2.40	+0.11	0.277	0.089	0.366
All	57.70	34.66	8.40	4.85	16.00	1.06	30.42	+4.24	0.277	0.084	0.361
excluded regions	3.42	1.85	0.43	0.20	0.95	0.13	1.71	+0.14	0.277	0.058	0.335
Total	61.12	36.51	8.83	5.05	16.95	1.19	32.13	+4.38	0.277	0.083	0.360

Source: see appendix

Notes: The regions have been rearranged and compressed to make them more comprehensible, and to make them comparable with the regional groupings of Lositsky's 1917 balance.

In the original Vilson compressed the food and feed items together and did not provide an indication of his population data. The population data have been calculated from his regional net production and net production per capita figures. The food item could then be calculated separately using the population figures and the fixed and regionally undifferentiated personal consumption norm, (see text).

dubious[1], but nevertheless on the whole the balance is probably a fairly good indication of the overall regional balance of grain production and utilisation.

ii) Lositsky's regional grain forage balance 1917/18

This balance was remarkably complete as regards its regional coverage, but far less complete as regards its coverage of grains. Regionally it covered the 46 gubernii of European Russia, the 4 oblasts and gubernii of the North Caucasus, 11 oblasts and gubernii in Siberia, 8 gubernii and oblasts of Transcaucasia and 5 gubernii and oblasts of Turkestan, i.e. all the regions of the Russian Empire apart from Poland, Finland, Yakutskaya, Kamchatskaya and Sakhalinskaya oblasts. Poland and Finland are being excluded from all our calculations so we need not be concerned about their loss. And the three far eastern regions were excluded from most of the series of data that we have been considering.

As regards the coverage of grains, only the six main grains were included i.e., rye, wheat, oats, barley, millet, buckwheat, The most obvious omission being maize.

The population data are based on the agricultural censuses of 1916 and 1917 and the urban registration of these years, These figures covered the 'on hand' population rather than the permanently registered population that were covered in the TsSK registrations. The population data given included the army, but they were listed as part of the rural

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1. Instead of assigning the whole of the residual to stock adjustments a large element of it should certainly have gone to losses and an unreported consumption e.g. private brewing and distillation (samogon).

population with no means of distinguishing them from the rest of the rural population[1].

The livestock numbers came, with a few exceptions[2], from the 1916 agricultural census as the results of the 1917 census were not available at the time. The numbers of urban livestock were not included in the agricultural census and so were estimated from the results of the 1912 military horse census. Lositsky made the rather crude assumption that the level of losses of urban horses to the army was as high as to account for half the number registered in 1912. Urban livestock other than horses were not included. I assume that the military livestock were also included with the rural livestock in the balance, but I have not been able to check this.

The personal consumption norms and livestock feed norms that were used by Lositsky have already been described above[3].

The overall regional grain forage balance given by Lositsky, with adjustments to divide it into my five regional groupings is given in the table over the page.

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1. There was not even much of a reference to the fact that they were there. Lositsky (ibid.,p. 20) states only that the army were not registered in the towns. But it was, after all, wartime, when this work was being prepared, and in wartime you do not publish detailed accounts of the location of your troops.
2. The numbers of horses in Transcaucasus and Turkestan were not covered by the census and so were estimated from the TsSK 1915 statistical account.
3. See p. 116 for Lositsky's personal consumption norms and p. 125-7 for his livestock feed norms.

The regional grain forage balance for 1917/18 in mln tons from Lositsky's data

Region	Population in mlns urban	rural	all	Prodn.	Utilisation Rural seed	feed	food	all rural	Urban urban	all	Balance	Consumption norms per head of popln in tons: urban	rural	all
1/NCR	9.14	20.50	29.64	6.13	1.57	2.53	3.52	7.63	1.20	8.83	-2.69	0.131	0.172	0.159
2/SCR	3.03	11.33	14.36	1.81	0.40	0.60	2.41	3.42	0.40	3.82	-2.00	0.131	0.213	0.196
3/SPR														
a)Ukraine	8.39	24.86	33.24	20.29	2.94	3.62	5.71	12.27	1.34	13.61	+6.68	0.160	0.230	0.212
b)S.Kavkaz	1.05	4.45	5.50	4.22	0.64	0.85	1.14	2.64	0.17	2.81	+1.41	0.161	0.256	0.238
3/All SPR	9.44	29.31	38.74	24.51	3.58	4.48	6.85	14.91	1.50	16.42	+8.09	0.160	0.234	0.216
4/CPR														
a)Tsent Zemled.	2.09	13.51	15.59	6.93	1.42	1.38	2.98	5.78	0.34	6.12	+0.81	0.163	0.221	0.213
b)Volga	3.21	18.06	21.27	6.85	2.02	2.61	3.97	8.59	0.44	9.03	-2.18	0.137	0.220	0.207
4/CPR	5.30	31.57	36.87	13.78	3.44	3.99	6.95	14.37	0.78	15.15	-1.37	0.147	0.220	0.210
5/EPR														
a)Urals	0.91	6.15	7.06	3.14	0.88	0.87	1.34	3.09	0.12	3.21	-0.07	0.132	0.218	0.207
b)Sibir	1.51	8.23	9.74	9.81	1.07	2.81	2.07	5.95	0.24	6.19	+1.17	0.159	0.252	0.237
c)Steppe Krai	0.47	3.73	4.20		0.28	1.12	0.97	2.37	0.08	2.45		0.166	0.260	0.250
5/All EPR	2.89	18.11	21.00	12.95	2.24	4.80	4.38	11.42	0.43	11.85	+1.11	0.148	0.242	0.229
All USSR	29.79	110.81	140.60	59.19	11.23	16.40	24.12	51.75	4.31	56.05	+3.13	0.145	0.218	0.202

Source, A.E.Lositsky, Urozhai khlebov v Rossii v 1917 g., M.1918, pp.29.46,47, and see appendix

Lositsky's data indicate the following four points:

First, the deficiencies in the NCR were very large, accounting for 2.7 million tons of grain which was 44% of the grain produced in that region. In the 1850s according to Vilson's balance the NCR deficiency had only represented 9.2% of the production in that area. As we shall see from the Nifontov series of balances the size of the NCR deficiency had been rising steadily throughout the nineteenth century. But nevertheless the position must have got much worse during the war with the large numbers of soldiers stationed in this area and the rapid wartime increase in the urban population.

Secondly, we see the large scale of the deficiencies in the other consumer region the SCR. The deficiency of 2 million tons here was only 25% less than the deficiency in the NCR, and as a proportion of SCR production it was 110%. According to these figures the SCR was very much more of a consumer region than was the NCR. This is a rather surprising result and probably indicates that the consumption norms were too high here or that the production data were rather incomplete.

Thirdly, we see a very significant deficiency of almost 2.2 mln.tons of grain in the Volga regions. These were traditionally the main supply regions for the NCR and a deficiency of this scale was a most serious phenomenon. This deficiency in the Volga completely dwarfed the surplus in the Central Agricultural region.

Fourthly, we see that the surpluses which did exist were mainly located in the SPR and in Siberia. (Even the Urals was a deficiency region). The SPR was traditionally an export region. Grain from the North Caucasus could relatively easily flow into the SCR, but supplying the NCR from either the SPR or Siberia would have represented major transport problems.

On the whole the picture presented in this balance with extremely high deficiencies in the traditional deficiency areas, but also in the major traditional supplier of surpluses to the NCR would appear to me to have been very serious. But curiously Lositsky and the wartime planners do not appear to have been too distressed by this picture[1]. They repeatedly stated that there was sufficient grain in the country and that it was not a production problem but only a transportation problem[2], But this is only true in the abstract. Figures can indeed be easily pushed around on a grain forage balance matrix, but in practice the task of making good a deficiency in the CPR was bound to be a very major problem.

There are several problems involved in accepting this balance. First, it excludes the industrial use of grain, which might well have been quite large. If the 1850s average per capita figure for the utilisation of grain for industrial use were applied to the 1917 population, then over 2.53 million tons of grain would be needed for this purpose, i.e. over 80% of all the recorded surpluses.

Secondly, the personal consumption norms used in this balance were very low ,37% below Vilson's norms but also 32% below the Klepikov norms[3]. The addition of 5% to Lositsky's norm would wipe out 1.4 million tons of the surplus. The addition of just 10% would wipe out most of it.

Thirdly, there is a factor which it is claimed operates in the opposite direction to these first two factors. It was subsequently claimed by Groman and other wartime planners who had been insisting on the abundant supplies

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1. It could be argued that it would have been bad for morale during the war to publish an account describing how disastrously serious the situation looked. But on the other hand it was clearly very foolish not to treat these problems as being serious.

2. See for instance A.E.Lositsky, ibid.,pp. 36 and 38

3. See above p.111 Klepikov gave an average rural consumption norm of 0.321 tons of grain per head per year, whereas Lositsky gave a norm of 0.218 tons per head per year.

of grain, that the production data in the census grossly under-estimated the real level of production. Groman subsequently wanted to add a correction of 19% to the 1917 production data[1]. Lositsky at the time argued that an under-estimation in the production data would make up for some of the possible under-estimations in consumption[2]. Later in the 1920s as we shall see below, Lositsky also offered his support to those who wanted to apply large corrections to the grain production data.

My analysis would indicate that the level of under-estimation of the 1916 level of production was probably far less than the 19% later claimed by Groman and his associates.

Overall, I would tend to agree with the view expressed by Lositsky in this work. I therefore think that this balance is a fairly reliable indication of regional requirements and surpluses in grain. However, I sharply disagree with Lositsky's evaluation of the seriousness of the picture which emerges from this balance.

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1. See above p. 220
2. See A.E.Lositsky, ibid., p. 21.

iii) Kondratiev's regional grain forage balance 1909/13

Kondratiev's balance has a fairly restricted coverage as regards both area and types of grain used.

It covered only the main producer areas.

And it covered only the four main grains: rye, wheat, oats and barley.

The production data were based on the 1909/13 Ministry of Agriculture yield data and for the most part on the sown area data from the 1916 agricultural census. But in certain regions like Novorossiisk, where there had been a large wartime decline in sowings by landowners these 1916 sown area data were replaced by data from the various zemstva statistical office covering the period 1909/13. Kondratiev admits that the Ministry of Agriculture yield data are probably a little higher than the real level, but he assumed that this will be compensated by sown area data being a little lower than reality[1].

The urban consumption norms were taken from the regional data presented in Kabo's study of urban consumption[2], and the rural consumption norms came primarily from the regional data presented in Chayanov's study[3], but supplemented with the results of a few additional studies[4].

Unfortunately Kondratiev gave no clear indication as to which population data he was using. He stated that the data he was using to divide the rural population between landowner households and peasant households came from the 1916 census[5]. But he implied that the total level of rural population

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1. See N.D.Kondratiev, ibid., p.206.
2. See above p 113-5 for an account of Kabo's study
3. See above p 105-10 for an account of Chayanov's study.
4. See N.D.Kondratiev, ibid., p.207. The additional studies covered Kharkov G.,Novorossii G., Perm G., and Vvatka G. Kondratiev notes that he had not been able to use the results of Klepikov's study because it only appeared after he had completed the work on these balances.
5. I will return to this in a later section, see p.276

came from pre-war data. It would consequently appear to refer to the registered population and not the 'on hand' population. As explained above[1] this would tend to give a higher level of rural population than really existed and so would increase the level of apparent rural consumption and lower the apparent level of extra-rural surpluses and the commodity share (tovarnost). If the level of rural population did somehow refer to the 'on hand' population, Kondratiev gives us no indication of how it was calculated.

The livestock consumption norms were taken partly from Lositsky's work on the 1917 harvest[2] and from other budget studies. The sowing norms were also taken directly from Lositsky's 1917 balance, but were of course applied to Kondratiev's own sown area data (see above).

The quantities of grain used for industrial purposes, i.e. in the distilling, brewing and yeast making industries, were taken from the government department in charge of excise and the state monopoly in alcoholic drinks (Glavnoye upravleniya neokladnyikh sborov i kazyennoi prodazhi pityei), for the years 1908/9 - 1912/13. Finally, the quantities of grain and flour (converted into their grain equivalent) which were transferred from one region to another were taken from one of the works produced for the 'Special Food Council in 1916[3] which covered the years 1909/13.

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1. See p. 84
2. See above p. 145-7
3. Proizvodstvo perevozki i potrebleniye khlebov, SPb.1916.

The main results of this balance when grouped into my main regions are given in the following table, in million tons.

Region	Prod-uction	Rural	All extra-rural	Extra Rural Urban	Extra Rural Industry	Transfer	Transfer As % of Prodn.	All extra-rural as % of prodn.
NCR								
SCR								
SPR	26.29	14.36	11.94	1.98	0.12	+9.83	37.4	45.4
CPR	17.94	11.34	6.60	0.76	0.14	+5.70	31.8	36.8
EPR	6.19	5.26	0.92	0.25	0.23	+0.44	7.1	14.9
USSR less SCR+NCR	50.42	30.96	19.46	2.99	0.49	+15.98	31.7	38.6

This table indicates that the SPR was the largest producer of surpluses in absolute terms and that it also had the highest proportion of commodity grain when the scale of commodity grain is calculated in either terms of extra-rural transfers or of extra-regional transfers.

The CPR was second in importance as regards the absolute size of its surpluses and also as regards its share of commodity grain. The scale of transfers in absolute terms and the share of commodity grain were much lower for the EPR.

This balance should be compared with the balance for the producer regions in 1917/18 given in Lositsky above, in order to see what the normal state of affairs is in the CPR. Here we see an extra-rural surplus in the CPR of 6.6 mln.tons and a total regional surplus of 5.7 million tons, in comparison with the deficits expected in 1917/18 in Lositsky's balance. The differences between the normal state of affairs and that indicated in Lositsky's balance will appear even greater if, as explained above, Kondratiev's rural population data really are based on the registered population instead of the 'on hand' population. It probably under-estimates the real size of the extra rural surpluses.

iv) Nifontov's regional grain forage balances 1850s - 1890s

Nifontov's regional grain forage balance covers just the 50 gubernii of European Russia and the main grains[1]. These may be supplemented with the data for Siberia from Pronin's study[2].

The production data and population data used by Nifontov in his study have already been discussed at some length above[3]. The consumption norms used in this study were quite simple. Nifontov began with the basic rural consumption norms of 2.25 chetverts per head (approximately 0.284 tons per head) for the rural population in the Non chernozem regions, and a slightly higher norm of 2.5 chetverts (0.315) per head in the Chernozem regions[4]. These figures included both grains and potatoes in grain equivalents. Potatoes accounted for under 10% of these quantities. The figures also referred to personal consumption and livestock feed combined. These norms were consequently considerably lower than the large norms given by Protopov and Keppen. They were probably fairly comparable with the norms given by Vilson in the 1860s and were certainly lower than the norms given by Maress, Chayanov and Klepikov[5].

In a second variant which Nifontov also applied to the data for the 1880s and 1890s the average consumption norm in the Urals rose from 2.25 chetverts (0.284 tons) per head per year to 2.5 chetverts (0.315 tons), and in the Lower Volga and Southern Steppe regions from 2.5 chetverts (0.315 tons) per head per year to 3 chetverts (0.378 tons) per head per year[6]. The urban population was given a norm of 2.25 chetverts (0.284 tons)

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1. Data are also available for the inclusion of potatoes if required. But for the purpose of this study they have been excluded from all but the most general of Nifontov's balances.
2. See V.I.Pronin, ibid.
3. See pp. 78, 191-202
4. See A.S.Nifontov, ibid., pp.199-202, 293-5.
5. See above
6. See A.S.Nifontov, ibid., p.295

per head throughout[1]. Unfortunately Pronin is not at all specific about what consumption norms he was accepting in his calculations of the grain balances for Siberia[2].

Although these consumption norms are very crude and make no allowance for a separate treatment of livestock, they are probably good enough to give a rough idea of the changes in the regional balance of grain production and utilisation.

An indication of the regional balances once rural consumption of grain has been deducted from grain production is given in the following table; in million tons

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1. A.S.Nifontov, ibid., p.305.
2. See V.I.Pronin, Istoriya SSSR, 1977, no.4, pp.70-1.

	1850s	1860s	1870s	1880s	1890s	Variant 2 1880s	Variant 2 1890s
NCR							
Production	6.90	6.89	7.17	8.06	8.92	8.06	8.92
Seed	2.60	2.38	2.29	2.36	2.34	2.36	2.34
Rural cons.	4.29	4.83	4.95	5.36	5.71	5.36	5.71
Rural surplus	+0.01	-0.32	-0.07	0.34	0.87	0.34	0.87
SPR							
Production	5.15	5.69	7.35	9.85	14.09	9.85	14.09
Seed	1.40	1.59	1.94	1.97	2.35	1.97	2.35
Rural cons.	3.15	4.42	4.77	5.78	6.92	6.18	7.36
Rural surplus	0.60	-0.32	0.64	2.10	4.82	1.70	4.38
CPR							
Production	10.86	11.78	12.89	14.11	14.32	14.11	14.32
Seed	3.27	3.22	3.26	3.31	3.06	3.31	3.06
Rural cons.	5.53	5.70	6.10	7.10	7.22	7.36	7.52
Rural surplus	2.06	2.86	3.53	3.70	4.04	3.44	3.74
EPR(N)							
Production	2.19	2.09	2.51	2.91	3.81	2.91	3.81
Seed	0.66	0.72	0.79	0.90	0.93	0.90	0.93
Rural cons.	0.98	1.21	1.28	1.47	1.29	1.64	1.44
Rural surplus	0.55	0.16	0.44	0.54	1.59	0.37	1.44
USSR(N)							
Production	25.10	26.45	29.92	34.93	41.14	34.93	41.14
Seed	7.93	7.91	8.28	8.54	8.68	8.54	8.68
Rural cons.	13.95	16.16	17.10	19.71	21.14	20.54	22.03
Rural surplus	3.22	2.38	4.56	6.69	11.31	5.85	10.43
Siberia							
Production	1.22	1.29	1.55	1.79	2.40		
Seed	0.31	0.35	0.38	0.43	0.52		
Rural cons.	0.72	0.81	0.91	1.08	1.33		
Rural surplus	0.20	0.12	0.26	0.28	0.55		

Rural surplus as % of all production

	1850s	1860s	1870s	1880s	1890s	variant 2 1880s	variant 2 1890s
NCR	0	-4.6%	-1.0%	4.2%	9.8%	4.2%	9.8%
SPR	11.7%	-5.6%	8.7%	21.3%	34.2%	17.3%	31.1%
CPR	19.0%	24.3%	27.4%	26.2%	28.2%	24.4%	26.2%
EPR(N)	25.1%	7.7%	17.5%	18.6%	41.7%	12.7%	37.8%
USSR(N)	12.8%	9.0%	15.2%	19.2%	27.5%	16.7%	25.4%
Siberia	16.4%	9.3%	16.8%	15.6%	22.9%		

Sources: see appendices and A.S.Nifontov, ibid., pp.134-5, 207, 296-7, and V.I.Pronin, Istoriya SSSR, 1977, no.4,p.70.

This table indicates several interesting points:

First, it indicates the changing state of affairs in the NCR as regards the size of its balance. After a relatively large level of deficiency in the 1860s and 1870s there is a fairly rapid improvement in the balance in the 1880s and the 1890s.

Secondly, we see the extremely large changes taking place in the Ukraine (SPR). After what appears to have been a fairly disastrous decade in the 1860s there is a very rapid growth in the size of surpluses, so that by the 1890s the Ukraine has overtaken the CPR as the major source of grain surpluses.

Thirdly, we see the much more stable position in the CPR, which was the traditional supplier of grain surpluses. There was only a very moderate, albeit stable[1], growth in the surpluses from this region, but its share in the total volume of surpluses produced in the 50 gubernii of European Russia fell steadily as indicated in the following table:

		NCR	SPR	CPR	EPR	All	Siberia
Variant 1							
	1850s	0.3%	18.7%	64.2%	17.1%	100%	6.2%
	1860s	-13.4%	-17.2%	123.9%	6.7%	100%	5.0%
	1870s	-1.6%	11.6%	81.5%	9.8%	100%	5.7%
	1880s	5.2%	32.7%	54.1%	8.1%	100%	4.5%
	1890s	7.6%	43.3%	34.9%	14.0%	100%	4.9%
Variant 2							
	1880s	5.8%	29.1%	58.8%	6.3%	100%	4.8%
	1890s	8.3%	42.0%	35.9%	13.8%	100%	5.3%

1. The stability of the supply of surpluses from this region is of course somewhat misleading. We are talking here about the stability of a ten-year average period. On an annual basis the volume of surpluses coming from the CPR was far from stable.

Finally we see a sharp decrease in the volume of surpluses coming from the EPR in the 1860s - 1880s in comparison with the 1850s but a great improvement in the 1890s.

Unfortunately Nifontov failed to give a regional breakdown of the extra rural utilisation of grain and so took his regional balances no further. This, I think, is rather misleading,particularly for the NCR. The NCR may have been increasing its extra rural surpluses at this time but if we take into account urban consumption we see a very different picture. I will attempt to carry Nifontov's regional analysis one step further by applying the consumption norm of (0.284 tons) to the regional urban population that I have calculated from Nifontov's data . This will provide us with the following indications of the regional balance for the total rural and urban population excluding now only industrial utilisation, exports and the army. These last three elements have been included at the bottom of the balance for the sake of comprehensibility, even though they were given with no regional breakdown.

	1850s	1860s	1870s	1880s	1890s	Variant 2 1880s	Variant 2 1890s
NCR							
rural surplus	0.01	-0.32	-0.07	+0.34	+0.87	+0.34	+0.87
urban use	0.67	0.77	0.85	-1.14	1.38	1.14	1.38
balance	-0.66	-0.45	-0.78	-0.80	-0.51	-0.80	-0.51
SPR							
rural surplus	0.60	-0.32	0.64	2.10	4.82	1.70	4.38
urban use	0.45	0.55	0.65	0.91	1.06	0.91	1.06
balance	0.15	-0.87	-0.01	1.19	3.76	0.79	3.32
CPR							
rural surplus	2.06	2.86	3.53	3.70	4.04	3.46	3.74
urban use	0.38	0.45	0.50	0.59	0.69	0.59	0.69
balance	1.68	2.41	3.03	3.11	3.35	2.85	3.05
EPR(N)							
rural surplus	0.55	0.16	0.44	0.54	1.59	0.37	1.44
urban use	0.03	0.05	0.01	0.07	0.07	0.07	0.07
balance	0.52	0.11	0.43	0.47	1.52	0.30	1.37
USSR(N)							
rural surplus	3.21	2.38	4.56	6.69	11.31	5.85	10.43
urban use	1.53	1.81	2.02	2.72	3.21	2.72	3.21
balance	1.68	0.57	2.54	3.97	8.10	3.13	7.22
Utilisation of balance							
Export	1.0	1.5	3.6	5.4	6.3	5.4	6.3
army	0.6	0.6	0.6	0.6	0.7	0.6	0.7
industry	1.0	1.0	1.1	1.2	1.3	1.2	1.3
Total balance residual	-0.9	-2.5	-2.8	-3.2	-0.2	-4.1	-1.1

Sources: For rural surpluses see table above,
For urban consumption see text and population data above p.78
For utilisation of total balance see A.S.Nifontov, ibid., pp.143,211,214,307,310

Note: The total balance residual is the difference between total utilisation and total production. Theoretically it should indicate the change in stocks and should over a period of time equal zero or a small positive number (if stocks are increasing). But in practice, since the reliability of so many elements in the balance are so suspect it is much more likely to indicate the scale of error. It indicates that either the utilisation data are too high or that the production data are too low.

All in mln. tons

Regional surplus(after rural and urban consumption) as % of production

	1850s	1860s	1870s	1880s	1890s	Variant 2 1880s	Variant 2 1890s
NCR	-9.6%	-6.5%	-10.9%	-9.9%	-5.7%	-9.9%	-5.7%
SPR	2.9%	-15.3%	-0.1%	12.1%	26.7%	8.0%	23.6%
CPR	15.5%	20.5%	23.5%	22.0%	23.4%	20.2%	21.3%
EPR(N)	23.7%	5.3%	17.1%	16.2%	39.9%	10.3%	36.0%
USSR(N)	6.7%	2.2%	8.5%	11.4%	19.7%	9.0%	17.5%

The relative contribution of the different regions to the overall level of regional surplus in %%

	1850s	1860s	1870s	1880s	1890s	Variant 2 1880s	Variant 2 1890s
NCR	-39.0%	-78.9%	-30.7%	-20.2%	-6.3%	25.6%	-7.1%
SPR	8.9%	-152.6%	-0.4%	30.0%	46.4%	25.2%	46.0%
CPR	100%	422.8%	119.3%	78.3%	41.4%	91.1%	42.2%
EPR(N)	31.0%	19.3%	16.9%	11.8%	18.8%	9.6%	19.0%
USSR(N)	100%	100%	100%	100%	100%	100%	100%

These tables indicate several important points: First, they indicate that despite the rising rural surplus in the NCR the balance after urban consumption still remained in deficit by about half a million tons in the 1890s and had been as high as 0.8 million tons in the 1880s. Secondly, it shows that the rural deficit recorded for the SPR in the 1860s appears much more serious when the SPR urban population is taken into account. The total regional deficit in these years appears to be as high as 0.9 mln. tons, over 15% of the production in these years. I would suggest that this is not a very realistic picture and that a lower series of consumption norms probably ought to be used for the Ukraine in the three decades before the 1880s.

Thirdly we see that the extra regional surpluses of the CPR and EPR are proportionally relatively high in comparison with their extra rural surpluses. This is because the CPR and EPR had a much lower level of urban population than the NCR or SPR.

Finally, overall we should note the very rapid rate of increase in extra regional surpluses, which doubled between the 1880s and the 1890s.

c) Grain utilisation balances according to type of producer

This section contains an account of several different types of balance. Most of the balances offer a breakdown according to production by peasant households on allotment land or production on landowner land. But some of the balances attempt to go further than this and offer a breakdown according to whether the peasant land was rented, privately purchased or part of the allotment land. Another more famous balance attempts a socio-economic breakdown of the peasantry into kulaks (the exploiter group in the peasantry) and the other peasants (bednyaki - poor peasants and serednyaki - middle peasants). None of these divisions are very satisfactory and even the division between landowner and peasant allotment land ultimately fails to take into account that it is primarily the peasant who is working the estate lands.

These balances are introduced in chronological order according to the time when the different balances were constructed.

i) Maress's grain balance

This balance was produced by L.N.Maress in 1897[1]. It referred primarily to the peasantry in the 1880s and attempted to divide their production according to whether the grain was produced on allotment land or private land and whether the land was owned by the producer or rented:

	Production net of seed in mln.tons.	in %	Commodity Surpluses in mln. tons	in %	% of Commodity surplus to net of seed
From all allotment land	17.60	(84.3)	1.92	(56.1)	10.9%
Rented allotment land			1.15	(33.6)	
Own allotment land			0.77	(22.5)	
From all purchased land	1.13	(5.4)	1.13	(33.0)	100%
From rented private land	2.16	(10.3)	0.38	(11.1)	17.4%
From all peasant land	20.88	(100.0)	3.42	(100.0)	16.4%
plus autumn sales of oats			0.49		
All including oats	20.88		3.91		18.7%

Source: L.N.Maress, ibid., p.54.

Notes: There is some uncertainty as to whether total production net of seed includes the production of oats. If it does not another 0.98 mln.tons should be added to net production.

It is unclear how the oats should be distributed between the different types of peasant producer, so it has therefore been excluded from the calculation of the relative share of the different types of producer in all commodity surpluses. Oats were apparently sold in autumn to pay for taxes. (See A.S.Nifontov ibid., p.301).

This table indicates the large proportion of commodity surpluses that comes from a relatively small share of purchased and rented land. There can be little firm statistical basis for these figures but they do at least give an illustration of the kind of proportions that statisticians at the time believed existed.

1. L.N.Maress, 'Proizvodstvo i potrebleniye khleba v krestyanskom khozyaistve', in A.I.Chuprov and A.S.Posnikov (eds.), Vliyanie urozhaev i khlebnykh tsen na nekotoriye storony russkogo narodnogo khozyaistva, tom 1, SPb.1897, pp.34-5.

ii) P.I.Lyashchenko's balance for 1901/5

This balance was produced by P.I.Lyashchenko in 1908[1]. At this time Lyashchenko was working as an economist for the Ministry of Trade and Industry. Lyashchenko produced separate balances for the food grains (which he defined as rye, wheat and also barley) and for oats. He gave a greater breakdown by producer for the food grains than for oats and so we cannot avoid considering these balances separately although this is really the subject of another section.

Lyashchenko's balance for food grains alone is given below followed by one with a less detailed breakdown by producer but covering the main food grains plus oats. Please note, all these balances are given net of seed.

This table indicates that the peasants are producing over 76% of all the grain and consuming 67% of all grain. Their commodity share according to these figures was only 12.4% and since the production figures refer to production net of seed, this is equivalent to a slightly smaller commodity share of gross production.

The landowners are producing just under 24% of the grain, but are only recorded to be consuming 4.5%, consequently have a very high commodity share of 81% or slightly less if we take into consideration seed expenditure. The reason for the very high commodity share for the landowners is their low level of consumption. All of the grain listed here as consumed by the landowner household is consumed as livestock feed and no allocation at all is made for personal food consumption. This is justifiable to the extent that the numbers of the landowner's household are considered to be the landowner's family only. But since we are concerned with the production of grain on the landowner's land, it might be more meaningful to make an allowance for the consumption of the labourers working on the landowner's estate. And this would clearly decrease the commodity share of the landowner land.

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1. P.I.Lyashchenko, Ocherki agrarnoi evolutsii Rossii, Tom 1, M.1923 pp.269-76. This was a later edition of a book which was first published in 1908.

P.I.Lyashchenko's grain forage balance for the 50 gubernii of European Russia in mln.tons net of seed 1901-5:

	Rye Wheat Barley	Oats	four main grains	four main grains in %%
Production				
Peasant allotments	21.43			
own land	2.87			
rented from landowners	2.46			
All peasant production	26.76	6.42	33.18	76.2%
Landowner	7.81	2.54	10.35	23.8%
All	34.57	8.96	43.53	100.0%
Consumption				
Rural				
Food				
Peasants				
(insufficient group)	5.72		5.72	
(sufficient group)	11.45		11.45	
(surplus group)	6.11		6.11	
All peasants	23.28		23.28	
Landowners	0		0	
All food	23.28		23.28	53.5%
Feed				
All peasants		5.77	5.77	13.3%
Landowners		1.97-	1.97	4.5%
All feed		7.74	7.74	17.8%
All Rural	23.28	7.74	31.01	71.02
Extra Rural	11.29	1.23	12.52	28.8
Urban food	3.18		3.18	7.3
Distilling and brewing	0.72		0.72	1.7
Export	7.39	1.23	8.62	19.8

Source: P.I.Lyashchenko, ibid., pp.275-7.

iii) Kondratiev's grain balance for different producers

Kondratiev's general regional grain balance for 1909/13 has already been introduced below. In this balance Kondratiev also gave a breakdown of the production and consumption for peasant households and for landowner households separately. The 1916 census data provided an indication of the size of landowner sowings and of the population of landowner households. As already explained above, in certain regions like Novorossiiskaya G., where there had been a large decline in the level of landowner households Kondratiev had used the zemstva sown area data instead. And it is hoped that he also adjusted the population data. In commenting upon his use of the 1916 census to assess the size of the landowner population, Kondratiev did admit that the indicated population would be somewhat lower than normal due to the mobilisation of hired labourers for the army. He adds that this would to some extent be compensated for by prisoners of war, and refugees working on the landowner estates, but all the same the resulting figure would be lower than normal and this would tend to under-estimate the level of landowner household consumption and therefore over-estimate the apparent commodity share of grain produced by the landowner estates[1]. In contrast with the Lyashchenko balance Kondratiev is clearly making an allowance for the consumption of grain by labourers on landowner estates. The levels of personal consumption and livestock feed norms were assumed to be the same for landowner households as for peasant households. Kondratiev justified this by explaining that the budget studies upon which the personal consumption and livestock feed norms were based, tended to reflect the position in the wealthier and better-off peasant households and their conditions were not much different from the average landowner household's conditions[2].

1. See N.D.Kondratiev, ibid., p.207
2. See N.D.Kondratiev, ibid., p.208.

The results of Kondratiev's balance for peasants and landowners separately in the three producer regions are indicated in the following table:

	Production in mln. tons	in %%	Consumption in mln.tons	Surplus in mln. tons	in %%	% commodity share
SPR						
Peasant	21.93	83.4%	12.95	9.00	75.4%	41.0%
Landowner	4.36	16.6%	1.41	2.94	24.6%	67.4%
All	26.29	100.0%	14.36	11.94	100.0%	45.4%
CPR						
Peasant	16.04	89.4%	10.74	5.30	80.3%	33.0%
Landowner	1.90	10.6%	0.60	1.30	19.7%	68.4%
All	17.94	100.0%	11.34	6.60	100.0%	36.8%
EPR						
Peasant	6.17	99.7%	5.28	0.88	95.7%	14.3%
Landowner	0.02	0.3%	-0.02	0.04	4.3%	200.0%
All	6.19	100.0%	5.26	0.92	100.0%	14.9%
All Producer Regs.						
Peasant	44.14	87.5%	28.97	15.18	78.0%	34.4%
Landowner	6.28	12.5%	1.99	4.28	22.0%	68.2%
All	50.42	100.0%	30.96	19.46	100.0%	38.6%

Source: N.D.Kondratiev, ibid., pp.212-24.

Note: a negative level of consumption as for landowners in EPR simple means that they purchased locally more grain than they consumed.

This table indicates several important points:

First, if we take all the producer regions together we see that the peasants produce 87.5% of the grain but only 78% of the surpluses, and that the landowners, although they produce only 12.5% of the grain, produce 22% of the surpluses. These are proportions that we will see repeated later on in connection with another balance[1].

Secondly, we see that the landowners overall had the commodity share of their grain production twice as high as the peasants.

Thirdly, in terms of a regional breakdown, we see that the SPR had the largest share of landowner produced grain (16.6%),the largest share

1. See the Stalin/Nemchinov balance on p.279

of landowner produces surpluses (24.6%), but the lowest indicator of commodity share for landowners in any region (41%).

As a comment on these figures it must be remembered that production refers to production net of seed, that these figures only cover the producer regions, and that Kondratiev himself admitted that they undoubtedly tended to over-estimate the commodity share of the landowner producers, because the landowner household population was under-estimated.

iv) The Stalin/Nemchinov grain balance for different producers

This is the most famous, the best known but the least well documented of all the balances for the pre-revolutionary period. It was presented by Stalin in his speech 'On the grain front' to students at the Institute of Red Professors in May 1928[1]. This balance divided the producers into three groups: pomeshchiki (the landowners), kulaki (the rich and exploitative group of peasants) and serednyaki together with bednyaki (middle peasant and poor peasant). No explanation was given as to how these groups were formed. The whole Stalin/Nemchinov balance is given in the following table:

	Production in mln.tons	in %%	Commodity part (extra village)		Commodity share
Pomeshchiki	9.8	12.0	4.6	21.6	47%
Kulaki	31.1	38.0	10.6	50.0	34%
Serednyaki & Bednyaki	41.0	50.0	6.0	28.4	14.7%
All	81.9	100.0	21.3	100.0	26.0%

Source: I.V.Stalin, Sochineniya, Tom,11, M.1949, p.85.

This table shows several important points:

First we see again that the peasants are producing 88% of the grain and 78.4% of the surpluses, while the landowners are producing just 12% of the grain and 21.6% of the surpluses. These proportions are indeed very similar to those given by Kondratiev in the previous section, but these figures appear to be referring to the entire pre-1939 area of the USSR and to all grains. The share of landowner production and commodity production could be expected to be much lower in the NCR and for the minor grains

1. See I.V.Stalin, Sochineniya, Tom 11, M.1949, pp.84-6.

(i.e. millet and buckwheat), and as noted above Kondratiev himself warned that his figures had undoubtedly over-estimated the commodity share of landowner production, so if the Stalin/Nemchinov divisions were based on the Kondratiev division, they should be adjusted in order to give the landowner a much lower commodity share.

Secondly, we should note the division between kulaks and the rest of the population. The kulaks were listed as producing 38% of the grain and 50% of the commodity surpluses. No definition of kulak was offered and these proportions do seem to be extremely high. They do not correspond to any of the divisions between producers that we have so far come across, and appear to be based on no statistical materials.

Given our lack of knowledge as to what this balance refers to, and the apparent over-estimation of the commodity share of landowners if it is partly based on Kondratiev's work, it is recommended that this balance should not be accepted as being a reliable indicator of the pre-revolutionary division of the grain forage balance according to producer. It has been included in this survey purely because of its political significance.

v) Modern Soviet historians on the grain balance for different producers in the 1850s.

Several modern Soviet historians have been interested in the question of the relative share of the peasantry and the gentry in producing grain surpluses in the decade before the emancipation of the peasantry. They all attack the view of P.I.Lyashchenko that the peasants supplied less than 10% of commodity grain in the 1850s. This opinion of Lyashchenko's was based on the generally accepted view of contemporaries[1]. This view was challenged first by V.K.Yatsunskii[2] in 1958, when he wrote that in the more remote regions away from the centre in Vyatka, the Urals, in the South and South West Steppe the peasants produced most of the commodity grain, and that even in the central producer regions, the Chernozem and the Central Volga the share of the peasants was much larger than 10% and closer to 33%

Yatsunskii's position was defended and extended by I.D.Kovalchenko in his monograph on Russian serf agriculture in the beginning of the nineteenth century[3], which appeared in 1967. Kovalchenko drew up a rough balance of commodity production for landowners and peasants separately, first, for all of European Russia and secondly for the major producer regions.

First, I will consider Kovalchenko's arguments for the all European data. Kovalchenko constructed a rough undifferentiated balance of extra-rural grain utilisation for European Russia in the 1850s, which gave a total figure for extra-rural utilisation of 38 mln.chetverts (about 4.8 mln.tons)[4]. The gross production of landowner estates at that time was estimated to

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1. See P.I.Lyashchenko, Ocherki agrarnoi evolutsii Rossii, M.1925, p.125
2. V.K.Yatsunskii, 'Osnovniye etapyi genezisa kapitalisma v Rossii', in Istoriya SSSR, 1958, no.5, pp.84-5.
3. I.D.Kovalchenko, Russkoe krepostnoe krestyanstvo v pervoi polovine XIX v., M.1967, pp.338-9.
4. See earlier section p243 for this and other undifferentiated balances.

have been 45.2 mln.chetverts[1] (about 5.7 mln.tons). Assuming that as a maximum the commodity share (tovarnost) of the landowners estates would be 50%, then the maximum amount of commodity grain that could have come from the landowners could only have supplied 59% of all commodity grain. And Kovalchenko prefers a slightly lower level of commodity share for the landowner estates, some 45%. Consequently Kovalchenko estimates that the landowners supplied only 53.5% of all commodity grain.

Secondly, Kovalchenko looked at the regional shares of landowner and peasant production of commodity grain in this period. The figures that he gave are presented in the following table:

	Production in mln tons	in %%	Commodity production in mln. tons	in %%	in %% of production
Tsent.Prom.					
Peasant	2.38	80.2	0.38	58.5	16.1%
Pomeshchik	0.59	19.8	0.26	41.5	45%
All	2.97	100.0	0.65	100.0	21.8%
Tsent.Cherno-zem					
Peasant	3.94	70.5	0.43	36.8	10.9%
Pomeshchik	1.65	29.5	0.74	63.2	45.0%
All	5.59	100.0	1.17	100.0%	21.0%
Nizh.Volzhskii					
Peasant	1.73	84.4	0.29	67.4	16.5%
Pomeshchik	0.32	15.6	0.14	32.6	45%
All	2.05	100.0	0.43	100.0	21.0%
Sred.Volzhskii					
Peasant	1.86	79.8	0.28	57.1	14.9%
Pomeshchik	0.47	20.2	0.21	42.9	45%
All	2.33	100.0	0.49	100.0-	21.0%

Source: I.D. Kovalchenko, ibid., p.339

Note: the proportions in this table work out somewhat differently from those given in Kovalchenko's table. I assume that there must be a misprint in his book.

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1. See I.D.Kovalchenko, ibid., p.338.

The production figures are available from Kovalchenko's study of the governors' annual reports[1]. The overall level of commodity share i.e. 21% in the Volga and Central Chernozem regions and 21.8% in the Central Industrial Region[2] were assumed on the basis of Kovalchenko's analyses of these regions, and the general level of commodity share for landowner lands was 45%. Given these figures the other figures in the table can be worked out.

This is again a very arbitrary procedure, of doubtful reliability.

More recently, in 1974, another historian, A.S.Nifontov, in a book that we have already much used in this thesis, also turned to the question of the relative share of landowner, serf and peasant in providing commodity grain surpluses in the 1850s and produced a much more detailed study[3]. Nifontov's balance divided the producers between landowners, serfs and state peasants. The population data were taken from the returns of the IX and X revizii as reworked by Kabuzan. The production data were based on Nifontov's analysis of the annual governor's reports. And the consumption of the different households was worked out in two variants. Variant 1 had a combined food and forage norm of 2.25 chetverts (about 0.284 tons) per head per year for the peasants and 2.5 chetverts (about 0.315 tons) per head per year for the landowners. Variant two had a norm of 2.5 chetverts (0.315 tons) per head per year for peasants in the Chernozem region, 2.25 chetverts (0.284 tons) per head per year for peasants in the non-Chernozem region and 3 chetverts (0.378 tons) per head per year for members of landowner households. The results of this balance are given in the following table:

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1. See above p.[illegible]
2. In the text Kovalchenko says 18%, but adds that in fact it was no lower than the 21% in the Producer regions. And in the table he uses 21.8%.
3. See A.S.Nifontov, ibid., pp.128-35.

The production, consumption and size of grain surpluses for different producers of grain in 32 gubernii of European Russia in the 1850s in mln.tons.

Variant 1	Landowner	Serf	State Peasant	All
NCR (N15)				
Production	0.76	1.90	0.68	3.33
Consumption	0.20	2.08	1.05	3.34
Surplus	0.56	-0.18	-0.37	0.01
SPR (N6)				
Production	0.96	0.95	0.36	2.27
Consumption	0.11	1.12	0.57	2.65
Surplus	0.85	-0.27	-0.21	0.38
CPR (N9)				
Production	1.51	1.84	1.73	5.08
Consumption	0.17	1.32	1.32	2.81
Surplus	1.34	0.52	0.41	2.27
EPR (N2)				
Production	0.01	0.18	1.23	1.41
Consumption	0.01	0.14	0.73	0.86
Surplus	-	0.04	0.50	0.55
USSR (N32)				
Production	3.24	4.86	4.24	12.33
Consumption	0.48	-4.75	3.91	9.12
Surplus	2.76	0.11	0.33	3.21

Variant 2				
NCR(N15)				
Production	0.76	1.90	0.68	3.33
Consumption	0.25	2.08	1.05	3.36
Surplus	0.52	-0.18	-0.37	-0.03
SPR (N6)				
Production	0.96	0.95	0.36	2.27
Consumption	0.13	1.35	0.66	2.13
Surplus	0.83	-0.40	-0.30	0.14
CPR (N9)				
Production	1.51	1.84	1.73	5.08
Consumption	0.20	1.48	1.50	3.18
Surplus	1.31	0.36	0.23	1.90
EPR (N2)				
Production	0.01	0.18	1.23	1.41
Consumption	0.01	0.14	0.73	0.86
Surplus	-	0.04	0.50	0.55
USSR (N32)				
Production	3.24	4.86	4.24	12.33
Consumption	0.58	5.04	4.17	9.78
Surplus	2.66	-0.18	0.07	2.55

Sources: A.S.Nifontov, ibid., pp.129,134-5.

As regards the relative proportion of grain surpluses produced by the different types of producer these figures tend to indicate that Yatsunskii and Kovalchenko were wrong and that Lyashchenko was correct in his assessment of the predominant importance of the landowner's estates for producing surpluses. According to the first variant the landowners estates produced 86% of the surpluses, the serfs 4.4% and the state peasants 10.4%, but according to the second variant the landowners produced over 97% of the surpluses, the state peasants produced the rest and the serfs were overall short of grain. Furthermore the only peasant surpluses which occurred were in the CPR and the EPR, as all peasant groups in both variants had a deficiency in the NCR and SPR.

As regards the proportion of commodity shares these figures indicate the landowners have a commodity share that averaged between 82% (variant 2) and 85% (variant 1), much higher than the figure of 45-50% which Kovalchenko had given as the maximum possible. The following table indicates the commodity share (tovarnost) for each of the types of producer in each region for the two variants, in %.

	Landowner	Serf	State peasant	All
variant 1				
NCR	73.7	-9.5	-54.4	0.3
SPR	88.5	-28.4	-58.3	16.7
CPR	88.7	28.3	23.7	44.7
EPR	-	22.2	40.7	39.0
USSR	95.2	2.3	7.8	26.0
variant 2				
NCR	68.4	-9.5	-54.4	-0.9
SPR	86.5	-42.1	-83.3	6.2
CPR	86.8	19.6	13.3	37.4
EPR	-	22.2	40.7	39.0
USSR	82.1	-3.7	1.7	20.7

These very large proportional surpluses and deficits are largely an

indicator of the extent to which it was important for the peasants to work for the landowner or get some other employment. In the NCR and SPR many serfs and peasants were clearly primarily concerned with work outside their own households, while in the CPR and EPR peasant production on their own land was far more important. The fact that the landowner producers had a larger commodity share than the peasant producers does not necessarily imply that they were more efficient. They were using peasant labour to produce their grain and part of the grain produced would have to be sold or in some way be distributed to the peasants. Most of the people who actually worked the landowner land have not been registered as part of the landowners household and included in the landowners balance, but have been included in the peasant households where they may not necessarily have been working. Lyashchenko is the worst offender at this, but to some extent such a procedure is unavoidable. These balances by producer group should therefore be treated with care.

6. Conclusions

The pre-war system of collecting administrative statististics had many weaknesses, but it was operating in a relatively stable environment in which there were few obvious pressures either for the peasants to conceal their real level of production, or for the statisticians to exaggerate them. There were consequently few a priori reasons to expect a high level of distortion. It is probably true that the statistics in all primitive economies tend to be only a reflection of reality and tend to suffer from some under-reporting. But inasmuch as there was no fiscal reason to conceal grain we may expect this level of under-reporting in Russia to have been fairly insignificant.

A detailed analysis of the harvest data from other sources indicates that TsSK yield data wereslightly lower than the results from the correspondents networks of the Ministry of Agriculture and the local zemstvo. But since these latter were in all probability a little high the level of yield indicated by the TsSK data is probably fairly reliable.

A slight under-estimate of sown area is to be expected, but there are no ways of assessing its exact significance.

The balances of grain utilisation that have been drawn up for this period cannot be used to confirm or dispute any hypothesis concerning the level of correction required to the production data. Most of the major items in the balance are known with only approximate certainty and the reliability of the food consumption component and especially the livestock grain fodder component in the balance are not known with any certainty at all.

The grain food consumption data that were amassed at this time and during the War appear to have greatly exaggerated the real level of food consumption

probably by as much as 10-15%. This was a consequence of a) the untypically high level of grain production and consumption in the households in which budget investigations were carried out and b) the natural inclination for subjective evaluations of food consumption to be exaggerated.

The livestock grain fodder component was known with much less certainty a) because of the uncertainty over the amount of livestock and b) because of the uncertainty over the amount of fodder fed to the livestock.

These two components in the grain utilisation balance account for over 60% of total grain utilisation. Of the remaining elements about 10-15% of the grain was used as seed. But although seeding rates are well known the amount of grain actually sown is of course ultimately dependent on the size of sown area and any correction made to the sown area will be directly reflected in the amount of grain required as seed.

During the War, especially after the introduction of the grain levy in 1916 and fixed price grain purchases, the environment began to change for the worse. The level of peasant concealment undoubtedly increased.

The local zemstvo statisticians were naturally reluctant to admit that the agricultural censuses that they had carried out in 1916 and 1917 provided less reliable indicators of agricultural reality than had the earlier official TsSK statistics. But with the change in peasant attitudes caused by the changed circumstances I think that this must have been the case. The extent of concealment was however likely to have been less than 5% more than in pre-war times for sown area and yield, i.e. less than 10% for production.

The results of the statistical investigation have been analysed in chapters 4 and 5. They indicate:

1) a relatively low increase in production in the first half of nineteenth century and then a rise in the second half after the 1860s. There was an increase in the rate of growth after the 1890s and especially in the decade before the war. Increases in sown area accounted for most of the early growth but from the 1890s the growth in grain yields became more important.

In terms of per capita production there was an overall decline until the middle of the century and then a growth, fairly rapid, after the early 1890s. It was this growth which provided the export surpluses. But even when the level of exports and the rather small amount of extra-rural marketings have been deducted from the gross production figures, there still remains an increasing level of overall per capita grain production.

The levels of yields fluctuated greatly, causing great fluctuations in the level of production. Very low levels occurred roughly every 5-6 years with particularly low points in 1891, 1897, 1906 and 1911.

2) In terms of a regional breakdown these data indicate

a) the relatively low growth of production in the NCR, caused by a decline in the level of grain sown area offsetting part of the increase in yields. Overall there was a quite substantial decrease in per capita production which required an increase in grain supplies from other regions. By the eve of the war as much as 3½-4 million tons of grain were being imported into this region, which was about 30% of the supply needs of this region.

b) Few data are available concerning the position in the SCR; grain production was relatively unimportant here and imports of up to half a million tons were sometimes required.

c) The SPR was a region which experienced a rapid growth in production through the nineteenth century. In the first half of the nineteenth century the growth was mainly a consequence of the increasing settlement of regions in the South East (Novorossia) and these regions continued to cause an increase in grain sown area throughout this period. But from the 1890s there was also a fairly substantial increase in yields. Per capita grain production rose dramatically from 0.35 tons per head in the 1860s to over 0.6 tons per head in the decade before the war. It was this large increase in per capita production in the south that provided the surpluses for the large grain exports. The yields in the SPR did fluctuate quite significantly but not as badly as in the CPR and they had a different synchronisation than those in the CPR. Therefore the growth in importance of the SPR led to a slight overall dampening in the harvest fluctuations for the country as a whole.

d) The CPR was the traditional supplier of grain surpluses to the NCR and the conditions in this region have tended to dominate the general conceptions on the state of Russian agriculture.

This region was the most over-populated with little space for the further expansion of grain sown area[1], except at the

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1. This does not apply to developments in the more distant parts of the CPR i.e. in the Lower Volga regions, where expansion continued and new settlements were being founded.

expense of decreasing the arable land and fallow. The reduction in the share of arable caused the reduction in numbers of livestock and the reduction in fallow was not accompanied by much improvement in crop rotations. This region was consequently considered to be in a crisis. There was a slight increase in yields and consequently also in the level of grain production, but this was not sufficient to produce a rise in per capita production. Yields fluctuated greatly in this region with very low levels in 1891 and 1906. The 1906 low level of production was much less serious than the 1891 case, because it coincided with a relatively normal yield in the SPR, and as explained above, the SPR was taking a larger share in total production by this date.

e) The EPR was the newest region and relatively unimportant in the overall grain balance until the last decade before the war when it began to experience a rapid growth. Livestock farming was fairly advanced in some regions of the EPR on the eve of war and must have consumed some of the local surpluses, but in other parts of the EPR (especially in Kazakhstan) the amount of grain fed to animals was very low.

3) The distribution of production between the different types of producer is much less certainly known due to the pomeshchik estates being grouped together with other private holdings as distinct from peasant allotments. Only with the 1916 census are more definite indications available and they are possibly not typical of the pre-war situation. Nevertheless it is clear that the largest share of pomeshchik land was in the SPR and that they had yields slightly higher than average. In 1916 pomeshchik sowed only 7.5% of the total sown area so

they might well have sown 10% of the total sown area before the war and produced 12% of total grain production as Stalin claimed.

The pomeshchik households certainly produced a higher share of surpluses than other households. This was mainly because of the smaller number of workers per sown area i.e. 20 workers per 100 desyatiny sown as opposed to 87 workers per 100 desyatiny in peasant households. But partly also because of their smaller number of horses per sown area 19.5 per 100 desyatiny as opposed to 41.9 horses for the same area in peasant households. But a regional comparison of these data would indicate a somewhat less distinct difference. Increasing the scale of farms in the less densely population areas was likely to do little to relieve the problem of over-population in other areas.

4) During the war years there was a slight decrease in sown area and production in all regions apart from the EPR which experienced quite a rapid growth. The exact timing of the decline is somewhat unclear, due to the uncertainty over the relative reliability of the earlier TsSK data and the agricultural census data for 1916 and 1917. I have suggested that the census data was less reliable than the earlier TsSK data, due mainly to the increase in peasant hostility and suspicion.

But it is clear that the 1915 harvest was relatively high in all regions and the 1916 harvest only a little lower. The 1917 harvest while also being relatively high in the NCR, SPR, and EPR was however very low in the CPR.

The war created a large demand for grain surpluses in the

NCR partly for the army but also for the large numbers of refugees. Although much grain must have been available in the SPR due to the stopping of exports, the 1917 shortfall in CPR production was bound to cause an extra strain in the NCR. This appears not to have been fully realised by the officials who were attempting to plan supplies at this time.