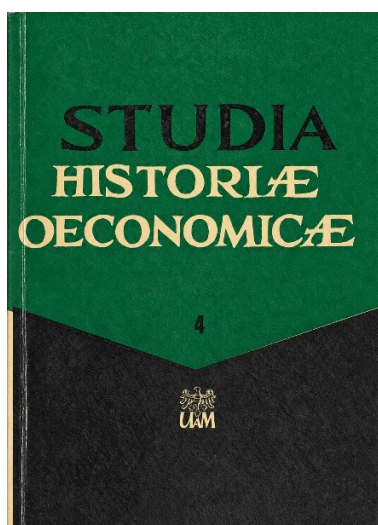




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THE AGRICULTURAL PRODUCTION AND ITS AMOUNT IN THE XVIth CENTURY POLAND

An essay on the methods of economic research ¹

The problem proposed is the quantitative description of the character and the amount of the agricultural production in the XVIth century Poland as the example for studies pertaining to different countries. We have 4 ways of resolving this question:

- (1) research based on the study of the ecclesiastical tithes,
 - (2) research based on the number and the production of the mills,
 - (3) research based on the study of the different landed properties,
 - (4) research based on the study of the alimentary consumption.
- ad (1)

As we know the products, which composed the ecclesiastical tithe and the quantities of these products received by the church are known in general and the problem in respect to the particular church regions seems to be resolved. But the realities of the sources are more difficult. The ecclesiastical sources concerning the tithes give almost always the data in the form of monetary evaluation, without the exact description of particular kind of plants such as rye, wheat, barley and oats and they do not say anything about their quantities. In fact we have also the lack of data about the area obliged to give the tithes and about the participation of other minor products. Finally the tithes could be real tithes, i.e. one tenth of the basic agricultural production or conventional tithes, i.e. the amount of products or money instead of grains, which was not a result of the real production, but of the agreement between both parties. In addition we can say, that in several countries the tithe could be leased and the income, i.e. the monetary value of products divided between the church and the lessee, as it happened very often in France ². In the present state of research there is no real hope to obtain a probable picture of the former agricultural production with this kind of investigation.

¹ The text below presented is based on the analysis of the accounting material from the XVIth century and summarizes the results of the author's research included in the book: *Studies on the Alimentary Consumption in Poland in the XVIth and the First Half of the XVIIth Century* (in Polish) Warsaw 1969.

² See: E. Le Roy Ladurie, *Sur quelques types de revenus réels (XVI-e - XVIII-e siècles)*, IV Congrès International d'Histoire Economique, Sec. IV, Bloomington 1968.

ad (2)

Perhaps the second method i.e. the research based on the study of the mills and their production, namely the making of the grain into flour, and groats, is more promising. As a rule in European countries in the Middle Ages and the early Modern Time there existed sovereign rights concerning the mills, the rights usually distributed among the landed proprietors, and well known as a duty connected with the work of the mills. In general it was a rule that a part of grains being processed, named the „measures” was left to the landed proprietor. Very often the annual quantities of the grains received by the proprietor as well as their part left to the miller, who performed the work, are known.

This subject of research seems to be very easy, but in fact there are a great number of problems, which are not yet resolved. The studies written till the present day dealt chiefly with the technological questions of the production of the mills without investigating their productivity³. In spite of our hopes the proportions between the quantity of grains transformed and their part left as the „measures” — the proportions which were quite evident to the people in the past — are very difficult to establish. Even if the quantities left as the „measures” are given, the problem of grains and their processing is very complicated — we do not know the form of the final product: the flour, the groats or the malt. The number of the mills in general is known, but their different kinds (water mills, wind mills, horse mills), and their production capacity, especially the number of wheels in the water mills, as the mark of their productivity should be studied very carefully.

The studies of the production of the mills could be very successful in future, now however this kind of research is of no use. Besides, the study of the production of the mills is limited to the evaluation of the net grains production, or more exactly grains consumption, and in general it is the evaluation of grains without oats, the latter being left directly as fodder for animals. The advantage of those studies is the fact that the results could be well connected with the local production and consumption conditions, because the long transportation of the flour and the malt was very rare.

ad (3)

The direct study of the agricultural production forms the most developed and almost traditional kind of research. The number of publications dealing with the different estates in various regions, the rich material investigated, the methods well experimented, all the conditions and the results seem to form the doubtless basis for the establishing of the char-

³ H. Samsonowicz, *Rzemiosło wiejskie w Polsce, XIV - XVI wiek (Village Crafts in Poland, XIVth - XVIth centuries)*, Warszawa 1954, pp. 118 - 149.

acter and the amount of the agricultural production in the XVIth century. The reality is however quite modest — the studies, very important as individual progress in our knowledge, are not able to formulate any general ideas. The great landed property and its agricultural production was divided between very numerous peasants' tenures and less numerous proprietor's own farms named folwarki. The peasant tenures did not leave any quantitative material concerning their production. Neither did the gentry leave any economical archives preserved till our days. It is due to the fact that they watched their manor and folwark production by themselves. Only the great landed property: royal, ecclesiastical or magnate, which being administrated by officials and controlled by the proprietor or his deputy, formed and preserved the bills and other materials available to our investigation, but, as we said, limited chiefly to their own farming, i.e. to the folwark.

Recent research has proved that the character and the quantities of the agricultural production in the great estates, and chiefly in their manors, were different from those of the gentry manors and the peasant tenures. What more, even the production of the manors of the great landed property was different from that in the manors of the gentry. In this situation the scientific results, perhaps very interesting and well documented cannot be considered as typical for the general agricultural production all over the country. For instance the proportion between the various kinds of grains in the manors of the great estates was of particular kind; the corn was earmarked for a wholesale delivery and sold chiefly in Gdańsk, without respect to the own consumption needs. As a result we have the proportion between the production of rye and wheat in the great estates of the archbishopric of Gniezno, which was 9 to 1, while the presumed proportion for all the country, received by the other methods, was 8 to 1. The relation between the production of rye and barley was 6 to 1 in the archbishopric estates, i.e. in their manors, while for all the agricultural production the relation was 5 to 1⁴.

The yield ratio resulted from the research on the production of the great landed property is also doubtful. The agricultural work performed with the help of peasant "corvée" and the shortage of own animals and the manure in the manors of great estates did not allow the intensification of the agricultural production and the yield ratio remained low. The data from the great estates in the XVIth and the beginning of the XVIIth century Poland gives the average yield ratio for the principal 4 corns

⁴ J. Topolski, *Gospodarstwo wiejskie w dobrach arcybiskupstwa gnieźnieńskiego od XVI do XVIII wieku (The Rural Economy in the Estates of Gniezno Archbishopric from the XVIth to the XVIIIth century)*, Poznań 1958, p. 203.

⁵ L. Żytkowicz, *Ze studiów nad wysokością plonów w Polsce od XVI do XVIII*

about 4 grains⁵, while the results received with the other methods show the average yield ratio for the entire country between 5 and 6 grains.

We can also add that the manors were not taxable and their areas not measured in those times, which impedes also the exact estimate of their productivity. Finally, the sources preserved are not numerous, they concern chiefly the royal and the church estates and the greater part of them are not able to furnish us with sure statistical data.

The above mentioned examples confirm the thesis of different and non-typical results received by the direct study of the great estates and their economy. As we see the generalization of the character and the amount of the agricultural production on the basis of the material, and the research concerning the great landed property give results which cannot represent a general picture and are limited to their own manorial production of the basic grains only.

ad (4)

Perhaps the fourth method, mentioned above, i.e. the research on the alimentary consumption will give us larger and more exact results. This opinion is based on the supposition that the food necessities together with the seeds involved and the differences caused by export and import are the elements that can give us the probable quantities of agricultural production. And the supposition depends on the exactitude and correctness of research on the alimentary consumption which I shall deal with below.

Research on the alimentary consumption requires suitable sources and methods. As I have pointed out in other places, the descriptions of the ceremonial and sumptuous banquets and feasts are of no use for our purposes as well, as the above mentioned data concerning the nutrition of the higher classes is not appropriate for our study. The adequate sources must have the character of bills or similar accounting documents which present the quantities of products devoted for the nourishment of a definite group of people in a definite space of time. The chief necessity in this moment of research is the exact transposition of given data to the real food quantities and the presentation of these quantities in the units of weight and volume. As a result of overcoming these methodical difficulties and the calculations performed, we receive a list of the alimentary products in the form of an average individual daily ration, as has been presented by the examples in the series of short articles in the French journal *Annales* in the years 1960 - 1964.

The list of the alimentary products in reality reflects the basic agricultural production transformed into food, as we shall demonstrate below. In the case of the nourishment in the XVIth century Poland there were on the list: bread made from the rye and another, better made

wieku (*Studies on the Yield Ratio Level in Poland from the XVIth to the XVIIIth Century*), Kwartalnik Historii Kultury Materialnej XIV/3, 1966, p. 480.

from wheat, the latter being eaten in the minor quantities. Barley, millet and buckwheat supplied groats, which were completed in that part of nutrition by peas. Beer was made of barley (common beer) or wheat (fine beer) or of mixed corn, i.e. rye, wheat, barley and oats (cheapest beer). The cattle, chiefly oxen and cows, the sheep and poultry were the sources of meat, their substitute in fasting days being fish, very often herrings, and the pigs gave bacon and lard. Fat was used also in the form of suet, butter and linseed-oil. Finally there were cheese and salt, which completed the basic list of the food in the XVIth century Poland, as in the neighbouring countries of central Europe in that time.

This list reflects exactly — save the oats fed chiefly to horses — the structure of the agricultural production, which we can verify by means of quite different sources. The internal proportions of the successive articles in the daily ration list is also nearly adequate to their proportions (in raw products) of importance in the agricultural production.

Now, apparently, we can multiply the quantities of products included in our list by the number of days and the population of that time and receive the amount of net agricultural production of the country. But in fact the question is not so easy, and our food list requires a number of corrections. Firstly, it is the question of the basic alimentary list, which must be the basis for the large scale generalization. In the case of the XVIth century Poland the best seems to be the daily ration list calculated with the material dealing with the food products of the numerous manorial personnel in several estates. The reason for such choice is the fact that their social level was near to that of the peasant, the most numerous social group in old Poland. The list of the average daily ration concerning the nourishment of this type of the population is as follows:

Rye bread	0.920 kg
Wheat bread	0.022 kg
Barley groats	0.016 kg
Peas	0.046 kg
Millet groats	0.017 kg
Buckwheat groats	0.015 kg
Beer	1.2 l
Meat	0.020 kg
Fish	0.004 kg
Bacon and lard	0.030 kg
Suet	0.003 kg
Oil	0.005 kg
Butter	0.004 kg
Cheese	0.010 kg
Caloric value	ab. 3.500 kcal

The above list is not complete — it does not include vegetables, such as cabbage or turnips and various kind of fruits. The list does not mention also the salt. We can test the correctness of the list by the calculation of its caloric value, which is about 3,500 kcal and its structure. The food in its composition is dominated by the carbohydrates and shows a shortage of fat, which presents the structure representative for the nourishment of the lower social classes in Europe.

The next step is the evaluation of the social differences appearing in the older nourishment. Similar research on the nourishment in the gentry's court, nobles' castles and royal household proves that these differences were very important. The peculiarity of the nourishment in the higher social ranks at that time was marked by the greater amount of food, its different structure and the richer list of products involved, not mentioning the higher cost of it. The basic products were the same, but the list was longer and more diversified and it also included many imported articles, such as pepper, saffron and other spices, sometimes wine. The higher class nourishment was also of better quality, even the home products such as meat, fish, beer (chiefly produced from wheat) were better, sometimes completed by venison.

In the nourishment of the higher classes, although the basic products were the same, however they had different proportions — for instance the nobles ate more of wheat bread, much more of fish and meat, and more of butter and cheese: they also drank much beer. The quantity of fat was as well increased in this kind of nourishment, which is characterized by a better structure, save the presumable excess of drink (about 2.6 l of beer daily) and too great size of the whole daily ration, which had above 5,000 kcal, being perhaps in part wasted.

The demographic structure of the society at that time requires also some corrections in the calculation of the food which was necessary for the nourishment of the entire population. The high mortality, chiefly of the children and the short average age expectancy caused a situation in which the children formed a great part (about 1/3) of the society of those times. Even without considering that the nourishment of children was very different in its structure and composition from that of the grown up people, we must assume, at any rate, that one third of our ancestors ate below the normal amount of the daily ration.

These social and demographic corrections allow — given the number of the population — to evaluate the whole alimentary needs at that time for the average year, calculated separately product after product. With the quantity exported and imported this calculation gives the probable net production of agriculture which was needed for the population of the country.

The calculation mentioned above is not sufficient to establish the hypothetical average agricultural production in the XVIth century Poland. First, we must know what was the stability of the nourishment level, which might change and fluctuate from year to year, making our hypothetical calculation quite theoretical. Observations made with long series of the daily rations in different years prove that the relative stability of the nourishment existed thanks to the general use of the large stocks of grains preserved from the preceding years and thus the average level of the nourishment is not a mere theoretical assumption.

Secondly, it is necessary to recalculate with the adequate indices the quantities of the food, by changing them to the respective quantities of the agricultural raw products, i.e. bread and groats to the corn, beer to the grains, and also meat, fat and milk to the number of the animals, which were needed yearly for the production of those articles. This calculation is not difficult — save the one concerning the animals — because we can use now the same indices that were used before, in the calculation of the daily ration based on the informations of the sources.

The change of the global nourishment needs, counted in the raw agricultural products, to the full agricultural production is not easy to make. There are two difficult problems to be resolved there: firstly the change of the corn net production into the full production and secondly the change of the milk, fat and meat production into the number of the cattle and pigs. In the first case the use of the yield ratios is dangerous, because the yield ratios were calculated on the basis of the material preserved by the great estates only and the little errors in the yield ratios could be followed by great errors in the evaluation of the full production. We can take a more cautious course by using the data concerning the cultivated area, the system of the cultivation and the average quantity of the seeds. This way of the calculation gives the more probable yield ratios, which in the case of rye and wheat amounts to 5.8 grains and it allows us to evaluate the amount of the grains sown and finally the full production of the different kinds of corn, save oats.

More complicated is the evaluation of the number of the cattle and that of the pigs, which requires the study on the breeding of cattle and pigs, the studies which are hitherto very rare and fragmentary. We must gather all the information concerning the weight of the animals, the structure of the flock, the time of growing till the moment of becoming productive, and the presumable productivity of the cows (milk and meat), of the oxen (meat), of the hogs and the pigs (bacon, suet, meat) etc. With those data we can calculate the level of the cattle and pig breeding, the work which needs much caution, although some of the data, as the weight

of the animals were used before in the calculation of the daily rations of the food. Other questions require separate studies.

The work mentioned above allows us to make a hypothetical register of the agricultural production in the XVth century Poland, but without the Lithuanian and Ukrainian territories. I chose the moment about 1580, when this part of old Poland had the population of about 3 400 000 and the cultivated area was about 3 500 000 hectar.

Production:

rye	about 968 000 tons
wheat	„ 123 000 „
barley	„ 213 000 „
peas	„ 74 000 „
millet	„ 45 000 „
buckwheat	„ 46 000 „
linseed	„ 36 000 „

Animals:

cattle (without calves)	about 2 500 000	heads
in it: cows	„ 800 - 900 000	„
oxen	„ 700 - 800 000	„
pigs and hogs	„ 2 700 000	„

Production:

bacon and lard	about 30 000 tons
suet	„ 3 750 „
oil	„ 5 150 „
butter	„ 8 200 „
cheese	„ 29 000 „
beer	„ 12 800 000 hl.

The register presented above cannot serve as a sufficient description of the agricultural production. Using this method we have no means to calculate the production of oats, wool, poultry (with eggs) and vegetables and fruits. But the chief agricultural products could be evaluated and the structure and the quantity of the agricultural production could be presented, and that is the result, which is always valuable.

Besides, one may ask what is the degree of the probability in the picture presented above. There are two ways for the verification of our results: first, the comparison of the whole food production with the number of the population and second, the comparison of the agricultural production and the cultivated area. In the first case we have about 270 kg of grains per head yearly, which seems to be a comparatively reasonable quantity of food. The number of the cattle per 100 hectares of the cultivated area is about 70 heads of the cattle, among this number about 24 cows and 21 oxen — this quantity seems to agree with the material

concerning the peasant tenures and the number of cattle they owned and it suits to the needs of cultivation, which was generally made with the oxen as the labouring animals.

This short essay cannot be recognized as a definitive study, with the exactly calculated and fully proved results. However we hope that the presented research can encourage other historians to continue similar studies with more methodical skill and better results.