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“Chicken and Egg” Problem in the Meat Sector of Buryatia

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Abstract

During centuries animal husbandry was the most traditional agricultural activity of Buryats. Under the command economy the region was specialised in the meat sector, with the largest meat processing factory in Russia. Due to large imports from Mongolia the factory benefited from economies of scale. During the transition period Mongolia found new export markets for its products, hurting Buryatian imports. Moreover, the transition period hardships in Buryatia caused a substantial decrease in livestock production with an immediate decrease in meat production. To overcome the hardships of meat sector in particular and those of regional agriculture in Russia in general, it is essential to reveal the regional comparative advantages taking into consideration local agro-climatic conditions and resource endowments.

Buryatia has a risky agriculture, with grain yields of 1,1 t/ha, the yield of milk of 2400 kg per year, and daily average weight growth of cattle by 300 grams. Nevertheless compared with other regions, where animal husbandry experiences a steady negative growth, the last years witnessed a growth of cattle (4%-8%) in Buryatia. Also the large share (43 % compared with 27 % in Russia) of rural population; 35% unused agricultural land; rising rate of foreign investments (in 2007, 140% that of 2005).

The above mentioned and some other arguments encourage the hypothesis, that Buryatia has a comparative advantage for animal husbandry of agriculture and of meat processing sector.

The methodology of spatial equilibrium analysis using the GAMS programming techniques was applied to test the hypothesis. The results of the empirical model and the sensitivity analysis prove that among all the analysed meat products the development of sheep breeding industry has the highest comparative advantage in Buryatia. The model provides the optimal production and consumption quantities and prices, as well as recommends the optimal trade flows of the four selected products to other regions presented in the model. The favourable position of mutton production can be explained with the cultivation of native breeds of sheep and with the availability of pastures. Yet the chicken and egg problem remains: should the development of meat processing enterprises in Buryatia stimulate the development of animal husbandry or vice versa? Here is an adequate state intervention necessary.

Keywords: Buryatia, meat production, spatial equilibrium

Introduction and problem statement

During many centuries animal husbandry was the most traditional and prevailing type of agricultural activity of the Buryats. Also under the command economy the region was specialised in cattle breeding and meat production sector. The one of the two largest meat processing factories in the Russian Federation was situated in Buryatia. Processing also raw materials imported from Mongolia the factory benefited highly from the economies of scale.

On its way to change from planned to market economy Mongolia found new export markets for its animal husbandry products, which largely hurt the meat processing sector of Buryatia. Moreover, the transition period hardships in Buryatia characterized by recession in agriculture:

reduction of volumes of production of all kinds of agricultural products, number of livestock, outflow of rural population, etc. caused a substantial decrease in livestock production, causing an immediate decrease of meat production. The idle production capacities made the meat production non-efficient, which could not allow investing for new equipment, thus additionally decreasing the production efficiency.

Whereas today, providing preservation of biological variety of agricultural animals and through rational use of natural resources, it could be possible to organise ecologically clean and competitive meat and dairy production.

To overcome the hardships of meat sector in particular and those of regional agriculture in Russia in general, it is essential to reveal the regional comparative advantages taking into consideration local agro-climatic conditions and resource endowments (still unused large territories for pasture, qualified specialists, etc.).

Background and goal

The republic of Buryatiya is a region of risky agriculture with an average productivity of e.g. grain crops making only 1,1 t/ha. The productivity of agricultural animals is also quite low. The average yield of milk of a milk cow makes a mere 2400 kg per year, and daily average weight growth of cattle in agricultural enterprises reaches just 300 grams. Nevertheless compared with other regions of the Russian Federation, where the animal husbandry sector of agriculture is experiencing a steady negative growth since the beginning of the transition period, the last years witnessed positive growing rates of all kinds of cattle (from 4 % up to 8 %) in Buryatiya. Also other socio-economic indicators evidence a comparably favourable situation in Buryatiya. Thus, the share of rural population is extremely high (43 % compared with 27 % in Russia); only 65 % of the available agricultural area of more than 2 million hectares is being used; availability of higher and special educational institutions providing training in agricultural sciences; growth of volume of investments into agrarian and industrial complex reaching in 2007 the 140 % of the level of 2005.

The last years witnessed growth of number of all kinds of cattle (from 4 % up to 8 %) in Buryatiya, as far as many producers found it necessary to develop meat cattle breeding. The policy makers look for answers to questions:

1. is the animal husbandry production in Buryatiya competitive under the new conditions?
2. what kind of meat is the most favourable to produce in specific conditions of republic?
3. will the development of animal sector in Buryatiya stimulate the development of meat processing industry, or vice versa?

The purpose of our research is to assess the potentials of development of meat industry in Buryatia and in the adjacent regions in order to reveal the existence of comparative advantage in livestock production and meat sector under emerging free market conditions.

Methodology and required data

Method of Interregional Trade Modelling (ITM)

The ITM applied for this research work is a standard spatial equilibrium model, based on the concept of maximizing the net social welfare. Using non-linear programming techniques the ITM, determines the optimal quantities supplied, demanded and traded, together with the accompanying prices. The general form of the net welfare function (the objective function), for a commodity or a group of commodities, to be maximized is determined by the sum of the line integrals of the demand functions $D_j(Y_j)$ and the negative line integrals of the regional supply functions $S_i(X_i)$ over the appropriate quantity domains and negative sum of unit costs of transport T_{ij} multiplied by the transported quantities X_{ij} of the commodity, where the subscripts i and j represent supply and demand regions respectively. The economic surplus, consisting of consumer's and producer's surplus, can be used as a tool for measuring the benefit of market changes. The spatial equilibrium models methodology has been constantly developed in the

works of Bawden (1964), Takayama and Judge (1964 And 1971), von Oppen and Scott (1976), von Oppen and Maisch (1990), Khachatryan (2001) and others.

Empirical Model Specifications

As supply and demand regions we have considered five Siberian regions of Russia (Buryatia, Irkutsk, Krasnoyarsk, Zabaykal and Tyva), which were traditionally specialised under a certain kind of animal husbandry production during the Soviet era. E.g Irkutsk produced predominantly poultry, whereas poultry was not well developed in Buryatia. The selection of the model regions has been done taking into consideration the natural agro-climatic conditions, the adjacency of the regions, the similarity of production alternatives in animal husbandry sector, the production level and possibilities. Also parameters like consumer preferences, based on cultural tests, habits, and traditional dishes, characterised with high portion of meat products in the diet, purchasing power of the population are considered. Four products (beef, pork, mutton and poultry) are selected to analyse in the model. All the regions produce and consume all the four products.

The Required Data

The data for the model are acquired from secondary as well as primary sources.

The data on land come from agricultural surveys of the State Statistical Agency of Russian Federation (SSARF). Data on supply quantity (t) for all the considered commodities are from the Ministry of Agriculture of Russian Federation (MARF).

The data on the production of meat of different kinds for all the regions come from primary sources including meat producing farmers, managers at meat processing industries. These data are verified and complemented through expert interviews with the state officials at the agricultural departments of local regional administrations.

Data on demand quantity (t) are based on statistical data on consumption of meat and meat products (SSARF "Balance of Resources").

Quantities for regional imports, and exports attained from State Statistical Agency of Russia (Balance of Resources, 2006), have been used to verify the data on total supply and total demand. Data on meat varieties come from „Analytical review on the agricultural products and foodstuffs markets - the market of meat and meat products for 2006”.

For yield (t/ha) the calculations are based on data on actual use of agricultural land under fodder production. For cattle and sheep we considered fodder areas (pastures) and for pigs and chicken areas under grain and leguminous minus areas under wheat and vegetables production.

Data on supply price (euro/t) are coming from SSARF, which are converted into Euro, using the rate 1Euro = 36 Rubble. Data on demand price (euro/t) are attained from the market reviews provided on the official agricultural site of Siberian Federal District (sibagro.ru). Prices on mutton in Buryatia and Zabaykal are attained from local authorities.

Transport costs are provided by cargo agencies considering the truck transport.

Interpretation of the results of analysis

The model provides the optimal production and consumption quantities and prices, as well as recommends the optimal trade flows of the four selected products to other regions presented in the model. The base run shows that the total meat production in Buryatia should be increased by 33,4 thousand ton or by 68% . The model suggests that Buryatia specialises on the production of grazing animals. The optimal conditions require that the shares of mutton and beef in total meat production of Buryatia increase about 2%, where as the shares of pork and poultry decrease by about 3% and 1% respectively. It is not difficult to notice that the model suggests increasing the shares of grazing animals in total animal husbandry production.

The model suggests Buryatian and Zabaikalian producers to increase the volumes of mutton production more than 2 times (203 %). Producers in Tyva should reduce mutton production by 6,4 %. For Krasnoyarsk region the model suggests more balanced scenario, i.e. about 60 % growth in production volumes of all kinds of meat.

To reach the set volumes the model suggests to involve additional 117 thousand hectares of land (an increase of 16%), considering that 48 % of agricultural land in the region is not used.

The suggested growth of production volumes of pork and poultry in Krasnoyarsk and Irkutsk regions is very plausible: exactly these regions are specialised in large scale production of pork and poultry and possess significant amounts of fodder, produced locally. Moreover the model suggests the two regions to decrease the production territories (by 0,37 mln ha, i. e. by 31% in Irkutsk ,and by 0,32 mln ha, i. e. by 10% in Krasnoyarsk) by decreasing pastures.

The suggested increase of production of different kinds of meat in all the regions is quite plausible, considering the fact, that the production rates in all the regions have been decreased substantially during the transition period.

The equilibrium prices for the different kinds of meat in different regions are above the actual prices by about 10% to 48%.

According to the model results the following movements of products between the regions: Buryatia turns into an exporter of beef and mutton shipping its products to Irkutsk and Krasnoyarsk in total volume of 14,4 thousand ton. Instead the region imports about 16 thousand ton of poultry. This is explained with absence of industrial production of broilers in republic.

Conclusions and recommendations

Based on the results of the model we can conclude that Buryatia has a comparative advantage of mutton, as well as beef production. The increase of pastures will provide adequate conditions for the increase of production of grazing animals, especially sheep, which will allow the region to meet the local demand of mutton and export to the neighbouring regions. Instead the republic should decrease the production of less competitive kinds of meat (pork and poultry).

The following measures could be recommended to the policy makers:

1. The recovery and preservation of traditions of production of grazing animals and increasing the production efficiency through modern technologies should become one of directions of the regional agricultural policy of Buryatiya. With the aim of rush increase in mutton production the production of local aborigine (e.g. kalmik) sorts of sheep should be preserved and the production of quickly growing sorts of sheep should be further developed.
2. The development of meat processing should be intensively encouraged serving as a large market of realisation of the products of animal husbandry. The development of animal husbandry sector should define the scales of the meat processing industry.
3. It is necessary to provide conditions for recovery and development of the infrastructure of many underdeveloped sites of animal husbandry production.
4. More intensive and free trade between the regions should be encouraged influencing the interregional economic growth positively.

The conclusions based on the model results can however address the chicken and egg problem (animal husbandry production should be encouraged first or meat processing industry) in Buryatia only partially. A more exact solution could be provided by the market itself. The cattle farmers should look for more promising markets for their products most probably in the face of the meat processing industry.

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