DEVELOPMENT OF THE REGIONAL AGRICULTURE THROUGH THE CLUSTER APPROACH IN RUSSIAN FEDERATION

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ABSTRACT
At the current stage, the economy faces one of the main objectives – to ensure food security of the country. To achieve the goal the economy needs to address two main objectives: first, the economy requires a transition to the innovation-based development, and, second, the rate of food import substitution needs to accelerate. All this determines the strategic objective of the national agroindustrial complex (AIC) development – to increase the efficiency of production in agriculture. The article contains the cluster approach to the development of agriculture in the Republic of Altai. The authors propose five agroindustrial clusters to implement at the regional level and determine perspectives of their development. The model of meat production cluster implementation is described in detail.

Keywords: Cluster Approach, Development Strategy, Meat Production Cluster, State Support.
1. INTRODUCTION
The results of the scientific researches and the experience of the functioning of the agroindustrial formations of various forms of business entities prove the efficiency and reasonability of the agroindustrial integration [1]. However, the modern studies of integration processes in the agroindustrial complex of the Russian Federation do not reveal the problems of competitiveness improvement of enterprises in the integrated structures, their innovative development. There is no unified approach to evaluation of the innovative activity of enterprises and their efficiency [2-6].

The objective of the present study is to justify the theoretical and practical problems of development and increasing efficiency of regional agriculture through the innovative cluster approach. According to the objective the following tasks were set:

- to establish a methodological approach to the formation of the agroindustrial clusters within the frameworks of the regional agroindustrial policy based on the analysis of the integration processes, problems of innovative development and increase of the agricultural efficiency in the region;

- to justify the concept for achieving sustainable development of agriculture in the region through the cluster approach, development of the organizational mechanism for sustainable regional and sectoral partnership of agricultural enterprises, food industry, research institutions, scientific subdivisions of the higher educational institutions, combined by the program of the innovative and cluster development of the AIC in the region, aiming to ensure food security;

- to offer a complex of scientific and technical, logistic and economic measures providing the growth of agricultural production to supply the population of the region.

The object of research is the economic, organizational and managerial problems, intersectoral relations arising in the field of production, processing and sale of agricultural products.

The subject of research is organizational, economic and managerial relations, theoretical, methodological and practical problems of increasing the agricultural efficiency in the region based on the innovative and cluster development.

2. MATERIALS & EXPERIMENTAL PROCEDURES
In the modern conditions, the agricultural industry demonstrates the unstable dynamics of plant and animal production volumes, along with the decreasing investment activity and the financial instability of the agrarian enterprises [7]. These tendencies are mainly due to:

- low rates of technical modernization of the agrarian production;

- limited access of the agricultural manufacturers to the market under the growing monopolization of the distribution networks [8];

- undeveloped infrastructure in the field of production, storage and sale of agricultural products;
- low rates of social development of the agrarian territories, deterioration of the social and demographic situation, outflow of the working-age population, decrease of the rural settlement network, lack of qualified personnel [9-11];
- insufficient resourcing at all levels of financing.

To date, there are two approaches to the formation of the development strategy of the agroindustrial complexes: sectoral and mixed.

The authors believe that the cluster approach is required. In this case, the higher rates of agricultural development can determine the growth of the associated and supporting sectors:
- food industry (production of sausages, smoked meat products, biologically active supplements, panthohematogen and various balms produced on its basis);
- consumer goods industry (production of blankets, sleeping bags and other items made of wool);
- tourism (consumption of food products);
- power industry (energy supply of agricultural products processing) [12];
- wood processing industry (providing the AIC with the wood items);
- industry of construction materials (addressing the needs of the AIC),
- production infrastructure (communication, trade, transport);
- services (in the field of veterinary, law, etc., repair services, marketing services).

According to Porter, a cluster is "a geographic concentration of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions" [13; 14]. Porter formed a complex of determinants of competitive advantage of nations – the "competitive rhomb" (or "diamond") corresponding to the number of the key components of these advantages:
- factor conditions: human capital, natural resources, scientific and information environment, capital, infrastructural enterprises and the indicators of the quality of life [15];
- domestic demand conditions: quality of demand, its correspondence with the world market tendencies, formation of the level of demand;
- related and supporting industries (clusters of industries): raw material industries and primary processing, equipment, use of raw material, machinery and technologies;
- companies’ strategy and structure, inter-industry competition, strategic development, methods of internal organization, company management [13; 16; 17].

We understand a cluster as a group of commercial and non-profit organizations with an interrelated field of production and non-production types of activity and services concentrated around the primary production, which consider the membership in the group as an important element of their individual competitiveness. A cluster approach is opposed to the industry approach and differs from the mixed approach [18-20]. Whilst the industry approach does not provide the unity with the territorial planning, the mixed approach does not allow considering the interdependent relations of the major economic activities in the region [21; 22].

The practice of the foreign countries has considerable experience with the cluster approach in the economic policy aimed at the economic growth of the several industries and regions. Cluster is generally the basic industry element in Finland and in the countries of the Scandinavian Peninsula. Finland Economy Research Institute defines nine leading clusters in the national economy: forestry, information and telecommunication, steel, energy, business services, health care, machine building, food, construction.

The Dutch economy features ten leading clusters: assembling industries, medicine, chemical production, power supply, agroindustrial complex, construction companies, mass
information, commercial infrastructure enterprises, non-profit infrastructural organizations, transport.

The American economy has the following typical model of clusterization. The enterprises participating in the cluster structure are concentrated in one region. This allows better use of the raw material, labour and international potential. More than half of enterprises adhere to this principle. The widespread adoption of innovative technologies helped to develop the supplying industries (agriculture, production of packing materials, mechanization means) and the consuming industries (advertising activity, financial field) [23]. The American economy focuses on the development of the export-oriented or import-substitution cluster model. According to the report at the Council of competitiveness presented in 2001, formation and development of the regional innovative clusters in the USA were declared one of the major national priorities.

In the EEC countries, one can observe the Scotland model of cluster structure where a large industrial enterprise surrounded by several small companies acts as the core of development. The model of Italian cluster involves a soft and equal interaction of businesses of various forms and sizes. The works of the Swedish economists also feature the implementation of cluster approach [24-28]. Thus, the cluster approach is based on the analysis of the Swedish economy structure (the study of interaction of the large Swedish multinational corporations). Those clusters are based on the works of E. Dahmen "on the development blocks" where the development is based on the obligatory relation between the sector inclined to development and another sector, which progressive development is due to this inclination [29].

The cluster approach to the study of the economic processes of competitiveness is reviewed by a number of other scientists. J. Tolenado and D. Soliers define clusters as "fillers" or the interdependence of the sectors of economy upon the technological level based on the necessity of technological interactions of different industries and sectors of economy to provide the competitive advantages [30].

3. RESULTS
The territory of the Republic of Altai is 9290.3 thousand hectares. The lands of state forest fund (40.5%) and the lands of agricultural organizations and citizens (28.2%) account for the largest share in the structure of the land fund. For many years, arable lands occupied only 1.5% of the republic territory. As of January 01, 2016 the agricultural crops account for 19.3% of the total area of the republic. These are mostly agricultural lands – 85%, arable lands – 8% and hay fields – 6.8%. In 2015 the gross agricultural output in all categories of farms was 10621.2 mln. rubles, which is 0.7 % higher than in 2014 (in comparable estimates). At the same time, crop production decreased by 2.7%, while animal production increased by 1.6%. The share of agricultural production of the Altai Republic in the total production in the Siberian Federal District is only 1.7%. Nevertheless, the republic is one of the three leaders in production per capita, significantly outperforming other regions. Traditionally the Republic of Altai is the region specializing in the beef cattle. In 2010-2015 the dynamics of livestock in conditional heads amounted to (+29)% in all farms of the region. Cattle livestock prevails in the structure of livestock – 54%. Ust-Kansky district is the leader in the number of livestock in conditional heads per capita; this figure is 8.6. Ulagansky district is the leader in the growth rate of livestock (168%) (Table 1).
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Table 1 Typification of municipal areas in terms of livestock*

<table>
<thead>
<tr>
<th>First sign of typification</th>
<th>Growth rates of livestock in livestock units in 2010-2015, %</th>
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<tr>
<td></td>
<td>(-5)-20</td>
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<tr>
<td>Livestock in livestock units per capita in 2015</td>
<td></td>
</tr>
<tr>
<td>0.2-3</td>
<td>Turochaksky, Mayminsky, Chemalsky, Choisky</td>
</tr>
<tr>
<td>3.1-5.8</td>
<td>Kosh-Agachsky, Ongudaysky, Ust-Koksinsky, Shebalinsky</td>
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<tr>
<td>5.9-8.6</td>
<td>Ust-Kansky</td>
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</table>

The data from Table 1 the presence of significant differentiation of the municipal districts in terms of the accumulated livestock development potential.

The available livestock provides significant meat production. In 2015, livestock and poultry were produced for slaughter in live weight of 249 kg per capita in the region as a whole. With a standard meat consumption in the consumer basket of Russians of 58.6 kg, this means that the Republic of Altai can not only provide regional needs but also import meat to other regions [31]. In general, the region is characterized by underdeveloped processing production for animal products. The share of processed products (meat, by-products, sausages, semi-finished products) is not more than 10% of the volume of the produced livestock and poultry. The low level of processing is because 60% of livestock is in personal subsidiary farming, which leads to the naturalization of economy and the absence of growth factors of production marketability (Table 2).

*Interval rows of typing are formed according to the Sturges’ approach.

Table 2 Dynamics of meat production volumes and meat processing products, tons

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</thead>
<tbody>
<tr>
<td>Meat production (livestock and poultry for slaughter in live weight)</td>
<td>30400</td>
<td>40500</td>
<td>50500</td>
<td>53400</td>
<td>23000</td>
<td>175.7</td>
</tr>
<tr>
<td>Meat and food by-products of slaughtered animals</td>
<td>4825</td>
<td>4893</td>
<td>8034</td>
<td>5068</td>
<td>243</td>
<td>105</td>
</tr>
<tr>
<td>Sausage products</td>
<td>94.5</td>
<td>116.3</td>
<td>306.2</td>
<td>59.6</td>
<td>-34.9</td>
<td>63</td>
</tr>
</tbody>
</table>

To date, there are 15 production facilities on the territory of the Republic of Altai slaughtering animals and certified by the Veterinary Committee and the State Veterinary Inspectorate of the Republic of Altai for compliance with the requirements of the Technical Regulations of the Customs Union (TR CU) #880 “Safety of food products”. Of 15 meat processing enterprises, one enterprise (LLC Souzginsky Meat Processing Plant) is a medium-sized business, while 14 enterprises are small business entities. LLC Souginsky Meat-processing Plant and JSC Ust-Koksinsky Meat-processing Plant possess 53.7% of the production slaughter facilities of all the republic facilities and 66% of simultaneous meat storage facilities [32].
The share of the meat processing products accounts for 9.6% of the gross production volumes. The processing is mainly presented by slaughtering of animals in the slaughter farms. Such a low volume is due to the fact that personal subsidiary farms use the meat of domestic production without industrial slaughter, and because of export of livestock to the Republic of Kazakhstan.

The products of advanced meat processing do not even meet the domestic demand. With a capacity of domestic demand estimated at 2400 tons, regional processing capacities are able to satisfy only 2.4% annually. Considering the demand of tourists, the degree of market saturation is decreased by 1.5 percentage point.

The Republic of Altai provides for formation and development of five major clusters:

1. Meat processing and meat production.
2. Milk processing and milk production.
3. Horticulture and horticulture production.
4. Fish breeding and fish processing.
5. Biopharmaceutics.

To date, a number of key prerequisites have been formed in the Altai Republic for creation and development of the cluster for extensive processing of meat and the production of meat products (semi-products, sausages, meat delicacies).

The implementation of cluster policy must ensure complex development, which will lead to the positive synergetic effect for all participants of the food cluster [33-38].

Beef cattle breeding is differentiated according to the municipal districts. The most favorable conditions for beef cattle breeding were formed in Ust-Kansky, Ongudaysky, Kosh-Agachsky and Ust-Koksinsky districts. Fourteen enterprises are engaged in the primary meat processing, including the LLC Sougzinsky Meat-processing Plant and its interrelated enterprise JSC Ust-Koksinsky Meat-processing Plant, which possess 53.7% of the production slaughter facilities in the Republic 66% of simultaneous meat storage facilities.

Due to the fact that Mayminsky, Ongudaysky and Shebalinsky districts possess the geographical advantage and take the central place in the territorial structure of the regional economy compared to Kosh-Agachsky, Ust-Kokinsky, Ust-Kansky and Ulagansky districts, most of the raw material processing capacities should be located in these municipalities. Other municipal units that are mostly raw territories. Other districts can also have various meat processing facilities focused on the local markets (population, social budget institutions, catering establishments, tourist flow services). The agricultural enterprises, farming households, enterprises of primary and advanced meat processing (slaughters and slaughter points, refrigerated slaughterhouses and processing plants) shall become the core of the cluster (Fig. 1).

The cluster approach in the organization of cattle breeding and meat production indicates the need for formation of inter-cluster communications. Moreover, when forming the cluster structure it is necessary to ensure a decrease in seasonality of supplies of raw materials for the processing plants. This is possible by creating the conditions for farms working as the feeding points, and for storage of agricultural raw material [23].

Production of the primary and deep processing of meat will be the end products of the cluster. Namely: carcasses; large-, medium- and small-sized meats, sausages, smoked meats, products of Altai and Kazakh national cuisine, canned meat, meat semi-products, meat culinary products, and by-products. Resourcing of the meat production cluster involves the provision of land resources, human resources, material and technical resources (including fodder).
Once the main type of livestock breeding in the region is distant-pasture livestock breeding, land resources are the most important in the breeding process. The area of the land resources, its structure and yield are the initial indicators of the cluster competitiveness. Since currently, the livestock population has reached its optimal value; the prospective development of agriculture does not imply an increase in the area of land used [39; 40]. An important task is to increase the productivity of pastures and hayfields, increase the yield of arable land, and increase the nutritional value of various types of feed. Thus, the main factor of the resource support of the cluster development is high-performance personnel and investment resources.

Rapid development of the meat-processing cluster requires the following personnel: veterinaries, zootechnicians, agronomists, technologists, etc. At the same time, organizations engaged in the training of professional personnel for the cluster should ensure the formation of key competencies in business engineering in agriculture and meat processing.

The formation of meat production cluster requires the introduction of the new production facilities. Facilities of the primary meat processing should increase 4 times, while the facilities of advanced processing should increase 10 times. This requires the implementation of investment projects on the construction of feedlots [41], meat-processing enterprises, and implementation of transport and logistics projects. It is necessary to create "agro-parks" for the greatest effect from production localization [42-45]. The volume of production in slaughter weight exceeds the needs of the population in meat by 4.2 times. Most of the manufactured products are exported in live weight to Kazakhstan and other regions of Russia. However, the volume of sausage production covers only 0.4% of the demand for meat products as of 2015 (270 grams per 1 inhabitant of the Republic). When forming the sales policy and the cluster infrastructure of the market, it is necessary to consider the product range, which can be produced with the help of farmed livestock products – beef, lamb, Siberian deer meat. It is planned that 30% of the produced meat will be the products of advanced processing. Consequently, the final products of the meat cluster require distribution via channels that are directly connected with the end user (retail shops of various type, fairs and markets). Part of the livestock products will be sold in live weight through the wholesale raw materials channels [46].

The key indicators of formation of the meat production cluster in the Republic of Altai are:

- increase in the share of products manufactured by the cluster members [47], and first of all – the final products in the gross regional product and in the republic’s exports competitive in the Russian and international markets;
- increase in the number of new jobs within the cluster;
- increase the volume of R & D and innovation activities within the cluster;
- decrease of the percentage of non-conformity between the number of reduction in the percentage of discrepancy between the number of specialists graduated from primary, secondary and higher vocational educational institutions and the market demand for those specialists within the cluster;
- increase in the share of goods and services of small and medium-sized businesses produced and provided within the cluster through the mechanisms of outsourcing and subcontracting [48].

**Figure 1** Structure of meat production cluster
Evaluation of parameters of the inertial forecast development scenario of the meat production cluster was conducted using the Microsoft Office software package – Microsoft Excel. The prediction of indicators for 2018-2025 was made using the linear function of “PREDICTION” type:

\[ y = a + bx, \]

where \( a = \bar{y} - b\bar{x}, \)

\( b = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sum(x - \bar{x})^2}. \)

The authors revealed that because of the inertial development the cattle livestock will grow by 18.4% compared to the current level.

4. DISCUSSION

Creation of a cluster in the industry of beef cattle in the Republic of Altai helps to reduce the cost of production by 414 million rubles by 2025. Based on the data obtained the authors made a forecast on the development of agro-industrial sectors through the cluster formation, the results of which are presented in Table 3.

**Table 3** Target development scenario for the meat production cluster in the Republic of Altai (forecast)

<table>
<thead>
<tr>
<th>Target prediction</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle livestock</td>
<td>269.6</td>
<td>273.9</td>
<td>357.4</td>
<td>367.2</td>
<td>386.7</td>
<td>396.5</td>
<td>406.3</td>
<td></td>
</tr>
<tr>
<td>Gross production of cattle meat, thousand tons*</td>
<td>33.5</td>
<td>34.4</td>
<td>44.6</td>
<td>45.9</td>
<td>47.1</td>
<td>48.3</td>
<td>49.5</td>
<td>50.7</td>
</tr>
<tr>
<td>Gross production of milk, thousand tons*</td>
<td>86.9</td>
<td>85.9</td>
<td>112.4</td>
<td>111.1</td>
<td>109.8</td>
<td>108.4</td>
<td>107.1</td>
<td>119.4</td>
</tr>
<tr>
<td>Revenue from sale of branch products, mln. rubles</td>
<td>328.0</td>
<td>356.1</td>
<td>464.6</td>
<td>477.3</td>
<td>546.6</td>
<td>560.8</td>
<td>574.9</td>
<td>589.1</td>
</tr>
<tr>
<td>Prime cost, mln. rubles</td>
<td>222.9</td>
<td>241.9</td>
<td>245.7</td>
<td>249.5</td>
<td>282.5</td>
<td>286.8</td>
<td>291.0</td>
<td>295.3</td>
</tr>
<tr>
<td>Assignments to the budget of the Republic, mln. rubles</td>
<td>16.7</td>
<td>17.1</td>
<td>27.8</td>
<td>28.6</td>
<td>32.7</td>
<td>33.6</td>
<td>34.4</td>
<td>35.3</td>
</tr>
<tr>
<td>Net profit from sale of cattle breeding products, mln. rubles</td>
<td>26.3</td>
<td>28.5</td>
<td>54.1</td>
<td>54.9</td>
<td>58.2</td>
<td>61.1</td>
<td>62.2</td>
<td>65.0</td>
</tr>
</tbody>
</table>
5. CONCLUSION

1. The study revealed that in the modern economic conditions the agroindustrial cluster is the most perspective form of integration structure providing the sustainable development of the national AIC. The advantage of the cluster form of integration is its innovative character providing systemic synergies of business entities and state bodies, scientific and educational institutions.

2. As a result of the economic evaluation of the AIC of the Republic of Altai, the authors revealed that the share of agriculture in the Republic’s GRP is on average 4.72% for the period of 2012-2016. At the same time, the region is a leader in agricultural production per capita. The agroindustrial complex of the Republic shows positive dynamics through the development of the livestock industry.

3. According to the results of zoning, it was determined that the Republic of Altai has a territorial specialization corresponding to the branches of agriculture. Following the authors' calculations, Ust-Kansky, Ust-Koksinsky, Shebalinsky, Ongudaysky and Kosh-Agachsky districts that accounted for 24.3%, 16.8%, 15.2%, 14.3% and 12% of the total livestock products correspondingly, are the areas of developed animal husbandry. Whereas, Ust-Kansky, Ust-Koksinsky, Mayminsky and Shebalinsky districts are the districts of crop production accounting for 16.6%, 15%, 12.9%, and 12.5% of total production.

4. As a result of perspectives evaluation of the agroindustrial integration, the authors revealed that the livestock industry has the maximal potential in the formation of cluster structures in the Republic of Altai. The target development scenario is the most preferable. As a result of the cluster development, by 2025 the growth of all basic indicators of the industry development should increase: cattle livestock – by 60.4%, revenue – by 247.6%, assignments to the regional budget – by 196%. Thus, the measures offered within the frameworks of the AIC development of the Republic of Altai are efficient as they lead to implementation of the more attractive scenario from the economic point of view.

REFERENCES


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