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Technique of determining the value of products produced from recycled livestock

Our studies provide new evidence-based results, the use of which provides the solution of important applied problems, particularly in the implementation of state and regional diversification of export of agricultural products due to involvement in national economic turnover of recycled livestock sector. One of the research objectives is to reveal reserves of secondary raw materials, specify the activities ensuring their use, to evaluate the possibility of organizing the respective production process stages for the national economy through scientific analysis of secondary and primary data. The above method of determining the efficiency of secondary raw materials use enables to calculate the cost of secondary raw materials, depending on the number of production stages. Export of the processed recycled material unlike exports of raw materials is more economically expedient.

Key words: animal agriculture, livestock sector, diversification, recycled materials, second raw materials, national economic turnover.

Problem Statement. Kazakhstan's animal breeding from the earliest times has some special features that can certainly be attributed to the benefits that will enable the sector to contribute significantly to revenue growth, rural employment and, therefore, form a business environment in rural areas of the country.

Substantive analysis of the efficiency of the livestock sector of agriculture will assess its overall potential. Thus the rebirth of the livestock, we believe, will create a multiplier effect that is unique to contribute to the rebirth of agricultural production, the creation of rural infrastructure and increase income for local people, especially workers in small farms and effective involvement of the vast land resources in the turnover.

Further growth of the livestock should occur at the expense of the sector opportunities to realize its comparative competitive advantages that have appeared in the country over the years of independence. They are as follows: the rise of the population welfare, which caused a significant increase in demand for goods and products in the local market and potential export opportunities in the long run. The need to consider the problems from this point of view is explained by the fact that at present the export of animal products is low, but the potential of agriculture in Kazakhstan allows to fight on equal terms for free segments on the world market of agricultural products.

All of these products comprise 30 to 50 % of total slaughter weight. Using the raw materials with partial and deep processing will make not only nonwaste production possible but developing a new direction in processing and producing exclusive products forming a Kazakhstan's brand.

Comprehensive approach to recycling will most effectively utilize resources such as the livestock sector and related sectors and subsectors, to minimize the loss of secondary raw materials by diversifying. Expanding the range of animal raw materials use will meet the needs of the domestic market and position at external market in a new capacity, as well as to fully realize the geopolitical location of the republic as a whole and the East Kazakhstan region, in particular, to search for new partners with new export offers.

The scientific novelty of the proposed research is to create science-based areas of diversification of animal agriculture through the use of recycled materials.

Practical significance of the research. Building the domestic market of recycled livestock will contribute to the development of manufacturing with the use of innovative technologies, which in turn will provide better and more advanced processing of raw materials of animal husbandry. Implementation of this research is aimed at providing domestic manufacturers with raw materials of local production, and the population quality and green integrated products. Extending the range of raw materials used will increase the attractiveness of the livestock business environment, the introduction of modern, efficient recycling technologies will help to attract investors in this sector.

At the present time the issues of deep processing of secondary raw materials are limited to processing animal fur and skins. Research in this area will reveal the full range of applications with the capabilities of secondary raw materials processing technology.

Our studies provide new evidence-based results, the use of which provides the solution of important applied problems, particularly in the implementation of state and regional diversification of export of agricultural products due to involvement in national economic turnover of recycled livestock sector.

Literature survey. Focusing only on the meat and milk cattle a large layer of recycled materials falls from sale. The study of this kind of raw material will contribute to the development of new production and import substitution as a raw material and finished products, which will develop a new cluster in the village and bring innovative technologies in agriculture, which is traditional for the economy of Kazakhstan. However, the problem of secondary raw materials processing in livestock sector is still open scientifically.

The following scientists, Faivishevsky M.L., Mdinardze T.D., Kovbasenko V.M. and others dealt with these questions under the Soviet Union [1–5]. The characteristics of slaughtering secondary raw materials, describing the technique of their gathering and recycling for producing new products are considered in their papers. There are also physical and chemical properties, composition and changes which they undergo under the influence of various forces [6]. They also studied the processes of various kinds of processing in details, drew comparison between different techniques and methods, described the equipment, operating conditions and performance capability of the equipment, formulated quality specifications, sanitation measures and industrial safety precautions. In terms of the given research the sector of economy under investigation, e.g. usage of the second raw materials for forming export potential, has never been considered neither in theory nor in practice.

Research methodology

a) Findings. The research is planned to study and systematization of data on the current state, problems and prospects of development of agricultural market as a whole, and the livestock industry in particular, the evaluation of its meat productivity, analysis of factors affecting the increase in the average productivity of meat by a group of animals, identification of potential yield of secondary products, which is implemented by the authors using empirical and theory-based methods. Source data capture through investigation of agricultural agents is intended along with the secondary data, namely the public statistical information collecting primary information in terms of the the research. Survey data gathering methods are as follows: interviewing, interrogation; questionnaires; requests for certain information by e-mail.

All three of these methods can be used, if necessary, in the research for different audiences. The interview is used to get a general idea of industry experts and management departments about the development of the industry, the basic mechanisms of interaction between businesses and governments, the effectiveness of the implementation of government programs. Discontinuous sampling survey of the representatives of agriculture entities is a part of interview. The survey will be conducted via e-mail in case of remotolocation of farms and available respondents' technical means. Questionnaire in the form of requests will be sent to the e-mail addresses with the help of with the Office of Agriculture which reduces the research team members load, since space and time constraints are removed. Using email is of particular relevance for work in the regions.

One of the research objectives is to reveal reserves of secondary raw materials, specify the activities ensuring their use, to evaluate the possibility of organizing the respective production process stages for the national economy through scientific analysis of secondary and primary data. Thus, the following tasks are to be solved logically in this research:

- to analyze the potential of agriculture and livestock sector of the Republic of Kazakhstan;
- to prioritize the use of their livestock potential by method of grouping subjects by type, number of cattle;
- to employ a method of determining the amount of recycled materials by main types of livestock and the estimated average rate of yield;
- to build a management model for factors affecting meat production animals;
- to employ a method of determining the value of recycled materials products after a number of production stage;
- to determine export range potential of the of national and regional brands livestock production in agriculture.

b) Theoretical model. Determining the effectiveness of the use of secondary raw materials will be carried out according to the following algorithm: according to their types and directions of animal husbandry.

Step 1. Using the method of continuous observation (n-number of observations) to collect information in the slaughter shops: live weight, slaughter weight, the weight of «j» type recycled materials: wool, skin,

fats, blood, endocrine-enzyme raw materials, bile, spinal cord, bones, horns, hooves, cartilage; the actual sales price by type of secondary raw materials. Tabulation, coding and data classification.

Step 2. Determination of the average rate of yield of secondary raw materials for the main «j»-types and «i»-areas of livestock (1) and (2):

$$Q_{bcji} = \sum(Wli - Wsi)/n, \quad (1)$$

where Q_{bcji} — is the amount of secondary raw materials; Wli — is live weight in kilograms; Wsi — is slaughter weight, kg; n — is the number of observations.

$$Nji = Q_{spji} / Wli, \quad (2)$$

where Nji — output norm of secondary product.

Step 3. Evaluation of the average weight of the animals in the group of the investigated objects. For this purpose, objects of research are grouped according to certain characteristics. The number of head serves as a grouping indication since the volume output of secondary products depends on the number of animals in terms of the research. Exploding the phenomenon under study into groups the optimal number of groups and set the value of grouping interval should be selected. In this case the number of groups is determined by the formula (3):

$$K = 1 + 3,321 \lg n, \quad (3)$$

where n — is the number of units in the aggregate.

Knowing the number of groups you can calculate the value of grouping interval:

$$h = \frac{x_{max} - x_{min}}{K}, \quad (4)$$

where h — is the value equal interval; x_{max} — is the maximum value of a grouping variable; x_{min} — is the minimum value of the grouping variable.

Borders of the groups: Group I from x_{min} to $x_{min} + h$; Group II from $x_{min} + h$ to $x_{min} + 2h$; Group III from $x_{min} + 2h$ before $x_{min} + 3h$; Group IV from $x_{min} + 3h$ to $x_{min} + 4h$; Group V from $x_{min} + 4h$ to $x_{min} + 5h$; Group VI from $x_{min} + 5h$ to x_{max} .

Evaluation of the average weight of the animals in the group of surveyed objects is determined by the formula (5):

$$Vji = Wlavi * Nji * \text{Number of head} \quad (5)$$

where $Wlavi$ — is an average live weight of animals.

Step 4. Estimated total value of secondary raw materials (6)

$$Qji = Vji * P_{av}, \quad (6)$$

where Qji — is an initial value of the total volume of recycled materials; Vji — is the total amount of recycled materials; P_{av} — is an average price of the unit cost of secondary raw materials.

Step 5. Assessment of the influence of factors on slaughter weight. To examine the relationship between the selected features using the method of analytic groups it is necessary to make grouping on actual basis and to calculate the average value of the resultant variable for each group. This variable variation will indicate the presence or absence of a relationship from group to group. Let's create a model of the influence of feed consumption, breed, number of veterinary observations on meat productivity: y is meat productivity, kg (effective indication); x_1 is feed costs, thous and tenge (factorial sign); x_2 is the structure of the head of the livestock by species and breeds (factorial sign); x_3 is number of head (factorial sign); x_4 is the reproduction of the livestock; x_5 is the level of mechanization in production processes; x_6 is zootechnic activities; x_7 is production of output of secondary raw materials, tenge; x_8 is the size of the losses of livestock products. STATISTICA 6.0. is used for modeling.

Step 6. Estimating the cost of secondary raw materials, depending on the number of production stages by the formula (7):

$$A_m = P_{av} * q^{m-1}, \quad (7)$$

where A_m — is the final cost of the recycling product with m as a production stage; P_{av} — is an average unit cost of secondary raw materials; q — is the geometric ratio (the percentage increase in the value added at each redistribution) which is determined empirically; m — is a number of production stages, the factor indicating the number of production stages recycled.

Step 7. Economic efficiency of recycling is determined by the formula (8):

$$D = P^m - Q, \quad (8)$$

where D — is the added value of the final product made from recycled materials after m ; P^m — is the value of the product recycled after m production stages; Q — is an initial value of the volume of recycled materials.

Step 8. Predicting the size of the export component to the region total profit is determined using the data on the average level of exports of agricultural products in the region's GDP.

The above method of determining the efficiency of secondary raw materials use enables to calculate the cost of secondary raw materials, depending on the number of production stages. Export of the processed recycled material unlike exports of raw materials is more economically expedient.

c) Evaluation of the Model. A comprehensive assessment of the status and development of animal husbandry is based on the analysis of indicators of animal husbandry in the dynamics that characterize: the size and composition of farm animals by species and breeds; reproduction of livestock; the state of fodder resources; feed consumption and the quality of animal feed; the level of production processes mechanization; zootechnic activities; amounts of animal products; the volume of production of meat and by-products of slaughter animals; quality of the farm products; the amounts of the negative profits of livestock products.

d) Interpretation. Social effect, as a measure to facilitate the solution of a socially important problem, is to estimate the impact of the proposed measures to improve the level and quality of life. The social effect is complex, so it must include, in addition to the social consequences, the implementation of the innovation process and analyze the effect of the conditions of its implementation on the results obtained.

The expected effect can be differentiated by the beneficiaries as follows:

- nation-wide reduction of shadow turnover of all kinds of recycled materials; development of innovative-based manufacturing industries with processing technologies; diversification of the export component in the agricultural sector; resourcing domestic processors of raw materials; providing Kazakhstan people with quality green products; the diversification of exports and profit from export of goods with a high level of Kazakhstan content;

- for rural regions — increasing region-wide revenue of the district budget in the form of tax revenues; setting up new businesses in rural areas; encouraging the development of animal husbandry in the area as a profitable direction in agribusiness, and motivating creation of showy cattle husbandry, creating more extra jobs, increasing income of the villagers; an additional source of income for private farmers; reducing the outflow of people from rural areas; improving rural market, production and transport infrastructure; accessing to finance on loyal terms; forming of specific business- environment in rural areas; involvement of experts and professional and intellectual development of participants of processing.

The Research is to be implemented by the research team. The reason for its formation is a joint experience of the team members in the Research «Diversification of recycled livestock agro-industrial complex of the Republic of Kazakhstan as the basis of formation of an innovative rural business environment» ordered by the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan. Cooperation with Professor Iolanta Slonec (Doctor of Economic Sciences, Deputy Dean of the Faculty of Management, Lublin University of Technology, Poland) is planned in terms of the Research realization.

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Мал шаруашылығының қайталама шикізатынан өндірілген өнімнің құнын анықтау әдістемесі

Жүргізілген зерттеулердің жаңа ғылыми негізделген нәтижелері бар, бұларды пайдалану маңызды қолданбалы мәселелер шешуін қамтамасыз етеді, атап айтқанда, халық шаруашылық айналымына мал шаруашылық секторының қайталама шикізатты тарту есебінен аграрлық-өнеркәсіптік кешеннің экспортқа бағытталған өнімдер диверсификациялаудың мемлекеттік және өңірлік бағдарламаларын іске асырғанда. Ұлттық экономикадағы өндірістік бөлімдерге қатысты мүмкіндіктерді пайдалануды бағалау, шараларды белгілеу, қайталама шикізат резервтерінің бірінші және ретті деректерді ғылыми талдау арқылы зерттеудің міндеттерін жүзеге асыру қарастырылды. Өндірістік бөлімдердің санына байланысты қайталама шикізаттың құнын анықтауға мүмкіндік беретін қайталама шикізатты пайдалану тиімділігін бағалау әдістемесі ұсынылды. Өңделген қайталама шикізаттың экспорты, шикізат экспортына қарағанда, экономикалық тұрғыдан тиімдірек.

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Методика определения стоимости продукции, произведенной из вторичного сырья животноводства

Проведенные исследования содержат новые научно обоснованные результаты, использование которых обеспечивает решение важной прикладной проблемы, в частности, при реализации государственных и региональных программ диверсификации экспортноориентированной продукции агропромышленного комплекса за счет вовлечения в народнохозяйственный оборот вторичного сырья животноводческого сектора. Одна из задач исследований — путем научного анализа вторичных и первичных данных раскрыть резервы вторичного сырья, указать мероприятия, обеспечивающие их использование, оценить возможность организации соответствующих производственных переделов для национальной экономики. Приведенная методика определения эффективности использования вторичного сырья позволяет определить стоимость вторичного сырья в зависимости от количества переделов. Экспорт переработанного вторичного сырья в отличие от экспорта сырья экономически более целесообразен.

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