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A model for increasing the business activity of personal subsidiary farms based on small-scale poultry meat production

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ABSTRACT

The basis of this article is the study of such a form of farming in rural areas as personal subsidiary farms (PSF). The importance of private farming is actualized both in matters of a social nature in rural areas and issues of sustainable development of entire sectors of the economy. The article clarifies the main socio-economic functions of individual subsidiary farms. The basics of motivation and goal setting for entrepreneurship are considered. And in this regard, a model is given for increasing the business activity of personal subsidiary farms based on small-scale poultry meat production. The model is described both from the point of view of the mechanisms of interaction of participants and from the organisation's point of view. The financial mechanisms of this model and its features are also given. Many economists consider PSF the most massive, and economically stable; one might even say the surviving producer of agricultural products sustainably. This phenomenon lies in the economic nature of PSF. In these conditions, personal subsidiary farms are additional for those who are engaged in hired work. For the majority, this is about 3 million people who are considered "self-employed", the only source of income. Of particular interest is the financial model of this project, which was developed by the project's authors and tested for three years. This model allows you to reduce the price of finished products and keep it 15% below the market. The project showed that personal subsidiary farms without special conditions could not transform massively into individual entrepreneurs or peasant farms. To do this, the state needs to organize prototypes of such operators on the ground, which will begin to perform all intermediary functions to improve the business environment of each rural locality.

Keywords: Personal subsidiary farms, small-scale production, business activity, motivation for entrepreneurial activity, economic model of interaction

INTRODUCTION

Today, the Republic of Kazakhstan is looking for mechanisms through which it is possible to solve the socio-economic problems of the rural population, the main of which are: increasing the incomes of rural residents, increasing productive employment of the population, reducing the unemployment rate, both in rural areas and in the Republic as a whole. In Kazakhstan, the activities of private subsidiary farms are regulated by the Land Code of the Republic of Kazakhstan [1] and the Tax Code of the Republic of Kazakhstan [2]. In today's realities, private farms have become significant producers of both agricultural products in general and livestock products.

Table 1 shows that in the households of the population in 2019, up to 79% of dairy cattle, up to 65% of horses, up to 69% of sheep and goats and up to 16% of poultry are produced in the structure of production of all agricultural products.

This is because in 2019 more than 45% of the population of the republic or 7,733.8 thousand people out of 18,157.3 thousand people live in rural areas. Of the almost 4 million economically active rural population, about 500 thousand people are employed in agricultural production (according to the Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan).

Table 1 Statistics of livestock activity of agricultural enterprises and households of the population of the Republic of Kazakhstan in 2019, million tenge.

Type of activity	All categories of farms		Including					
			agricultural enterprises		Individual entrepreneur and peasant (farm) farms		households of the population	
	million tenge	%	million tenge	as a % of the total	million tenge	as a % of the total	million tenge	as a % of the total
Breeding of dairy cattle	928 885,6	100%	48 447,7	5%	141 988,7	15%	738 449,3	79%
Breeding of other cattle and buffaloes	627 938,3	100%	78 657,7	13%	148 333,8	24%	400 946,7	64%
Breeding of horses and other equine animals	211 114,3	100%	7 821,6	4%	65 486,6	31%	137 806,0	65%
Breeding of camels and other animals of the camel family	18 660,7	100%	1 411,6	8%	4 049,9	22%	13 199,1	71%
Sheep and goat breeding	217 378,6	100%	5 065,2	2%	62 282,3	29%	150 031,0	69%
Pig breeding	64 884,1	100%	22 049,9	34%	5 369,3	8%	37 464,9	58%
Breeding of poultry	238 489,4	100%	198 471,5	83%	688,0	0%	39 329,9	16%
Breeding of other animal species	12 145,7	100%	790,5	7%	2 374,0	20%	8 981,2	74%

Their average salary at the end of 2018 was 91,084 tenge, which is 1.7 times lower than the average in the whole country and is the lowest among all industries. Many economists consider personal subsidiary farms the most massive and economically stable; one might even say the surviving producer of agricultural products sustainably. This phenomenon lies in the economic nature of individual subsidiary farms.

According to the definition of many scientists, "personal subsidiary farming is a form of non-entrepreneurial activity for the production and processing of agricultural products carried out by the personal labour of a citizen and his family members to meet personal needs on a plot of land provided or acquired for personal subsidiary farming" [3, 4, 5, 6]. Other economists expand the importance of private farms and define them as "the main forms of economic activity of the rural population for the production of agricultural products to meet the needs of the population in food and to act as a means of solving problems to ensure food security of the country and the preservation and development of rural areas, rural lifestyle, national life and cultural heritage" [7, 8, 9]. The business activity of personal subsidiary farms as an economical category is also reflected in the scientific works of scientists [10, 11, 12, 13, 14].

When considering the business activity of personal subsidiary farms, it combines the concepts of the business activity of an individual as an owner and the business activity of an enterprise as an economy, on the one hand. On the other hand, a personal subsidiary farm is not an individual but cannot be attributed to a full-fledged enterprise. Also, the rural aspect of this issue further complicates the understanding and definition of the concept of business activity in private households.

Personal subsidiary farms are additional for those engaged in wage labour, and for the majority, it is about 3 million people who are considered "self-employed", in fact, the only source of income. The average per capita income of villagers from private households is only 20.1 thousand tenge per month. Such figures tell us that such a phenomenon as personal subsidiary farms should be studied, and interaction mechanisms with them should be built. This will lead to an increase in the income of the villagers.

Scientific Hypothesis

The study of the model of increasing the business activity of personal subsidiary farms based on small-scale poultry meat production will establish interaction mechanisms to increase villagers' incomes.

MATERIAL AND METHODOLOGY

Samples

A questionnaire survey, the method of questioning, was used to solve research tasks. A questionnaire survey was used to obtain the primary data. The object of the study was personal subsidiary farms focused on breeding broiler chickens in the Karaganda region (Republic of Kazakhstan).

Instruments

Questionnaire survey

Laboratory Methods

Our evaluation material was questionnaires and the respondents' answers to the questionnaire. The questionnaire contained 51 questions, to which the respondents answered numerically, verbally, or by supplementing the answers. The questions were open to respondents.

Description of the Experiment

Sample preparation: The sorting method studied and processed data from questionnaires filled out by personal subsidiary farms. Cumulative totals, interval, and percentage range in individual response classes

Number of samples analyzed: The study covered 70 respondents, including 70% of women and 30% of men. Most of the respondents were aged from 17 to 59 years (89%), that is, people of the "young" and "middle" age categories according to the WHO age classification.

Design of the experiment: In writing this article, depending on the nature of the tasks being solved, the following research methods were used: abstract-logical; monographic; economic-statistical; computational-constructive; graphic. Software products of general and special purpose were used in the course of the work: By the monographic method, all the main directions are studied and presented in this work: introduction, literary review, main results; Questionnaires were compiled by an experimental method to survey residents of the owners of private households; The graphical method was used to build diagrams, visualize models, functional relationships and mechanisms of interaction of model participants, as well as to visualize large amounts of statistical data; A financial model of the project was developed using the design calculation method; The abstract-logical method was also used to describe the basic ideas of the model, to put forward hypotheses, substantiate the relevance and novelty of this issue; The information and empirical base of the study was made up of official data stat.gov.kz, Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan, Report on the research work "Development of a model for the effective functioning of personal subsidiary farms on the example of poultry meat production", personal observations of the authors.

Statistical Analysis

Multiple correspondence analysis was used to visualize the data obtained from the questionnaire survey. Statistical significance was determined based on the significance of the p-value. The statistical program R studio (vs. 1.3.959) was used for data processing. Multiple correspondence analysis (MCA) is an extension of simple correspondence analysis to summarize and visualize a data table containing more than two categorical variables. It can also be understood as a generalization of the main components' analysis when the analyzed variables are qualitative instead of quantitative.

RESULTS AND DISCUSSION

Let's consider and define, in our opinion, the main socio-economic functions of private households in the Republic of Kazakhstan:

- 1) production and processing of agricultural products in small volumes for self-sufficiency,
- 2) increasing the income of rural families and their material security by selling surplus products,
- 3) solving the problems of rural employment related to the seasonal nature of the main work,
- 4) reduction of social aggravation and unemployment through the possibility of self-employment and independence from the employer,
- 5) increase in productive employment,
- 6) solving the problems of food security of the population,
- 7) introduction into circulation of unsuitable and hard-to-reach land plots,
- 8) labour education and professional orientation of rural youth,
- 9) care and support of older generations,
- 10) formation of the qualities of business activity,
- 11) consumption of fresh, high-quality, and environmentally friendly products,
- 12) preservation of rural areas, landscape, and biodiversity of species,
- 13) preservation of the identity and traditions of folk culture.

Thus, personal subsidiary farms are not enterprises and therefore do not pursue the goal of making a profit from their activities; their goal is only to close the need for food and significant savings on them. Another purpose of

running a private farm is to obtain surplus agricultural products for the sale and purchase of material assets, housing, children's studies, etc. On the other hand, the owners of private farms, if necessary, cover all their losses on maintaining a subsidiary farm and selling products from their salaries, which they receive at their main job. It is this way of personal subsidiary farms formed for decades that is most stable today. Today there is a division of villagers into those who have a main job and those who do not have it, i.e., self-employed.

For the first category, the management of private households for their owners is not the main, but auxiliary activity and is carried out in their free time from their main work. Knowing about the seasonal nature of the main activity of rural residents, the management of private households is a good help in the total income of the villagers.

For the second category, the management of private farming is the main activity, and the sale of private farming products is the main source of livelihood.

This classification of private farms gives rise to the further development of their self-employed owners into individual entrepreneurs or into their transformation into peasant farms. The basis for such a transformation can be the development of the business activity of the rural population. Scientists, economists, sociologists, and psychologists emphasize that business activity can be developed only through the creation of conditions. Let's consider the process of motivation for the development of personal subsidiary farms. This process is influenced by two driving forces: needs and opportunities, each of which has internal and external sources. The main internal need of a person is the need for self-realization, the realization of spiritual values and personal growth, as well as communication. The external need of a person is the receipt of monetary and material values, and the closure of the needs for food, housing, and security. The second driving force- capabilities are also divided into internal capabilities and external conditions.

The internal capabilities of a person consist of his housing and living conditions, material and living conditions, professional qualifications and knowledge, social skills and abilities, cultural and national traditions, mental attitudes, and health.

External conditions are the environment in which a person lives and works, in which the target settings are implemented, and are also divided into natural-climatic, geographical, socio-economic, and legal. And it is through the external conditions created that we could create an environment in which the owner of a private farm will make a decision and come to conscious entrepreneurship.

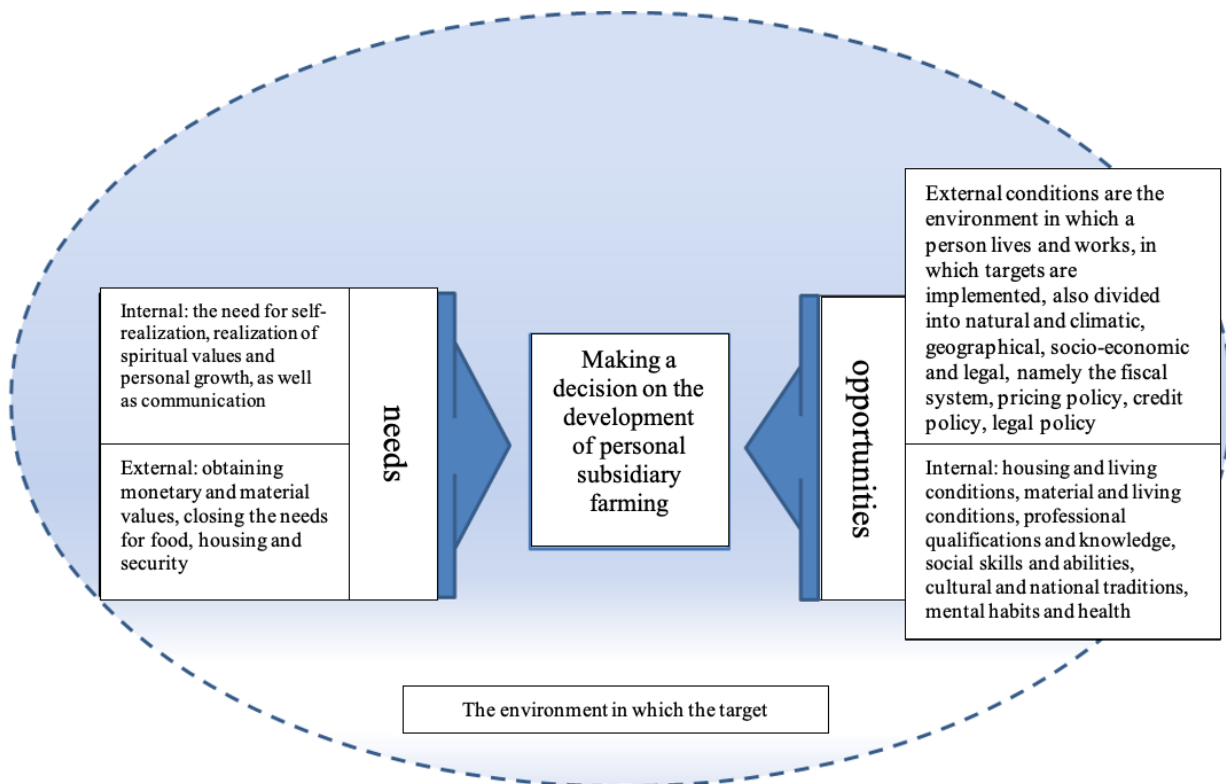


Figure 1 A model of the decision-making process for the development of Personal Subsidiary Farms.

Based on this model, we can say that it is possible to develop a system and a mechanism for influencing the development of the business activity of private households. In our opinion, the main directions of such support should be:

- 1) Development of infrastructure for entrepreneurship
- 2) Creation of economic conditions for entrepreneurship
- 3) Formation of social conditions and maintenance incentives for further growth of microbusinesses in rural areas.

All these areas are being successfully implemented within the framework of the pilot and long-term programs for developing the agro-industrial complex of Kazakhstan. Let's consider the survey results of the owners of private households [15] for their willingness to engage in entrepreneurial activity. The study covered 70 respondents: 70% were women, and 30% were men. Most of the respondents were aged from 17 to 59 years (89%), that is, people of the "young" and "middle" age categories according to the WHO age classification (Figure 2).

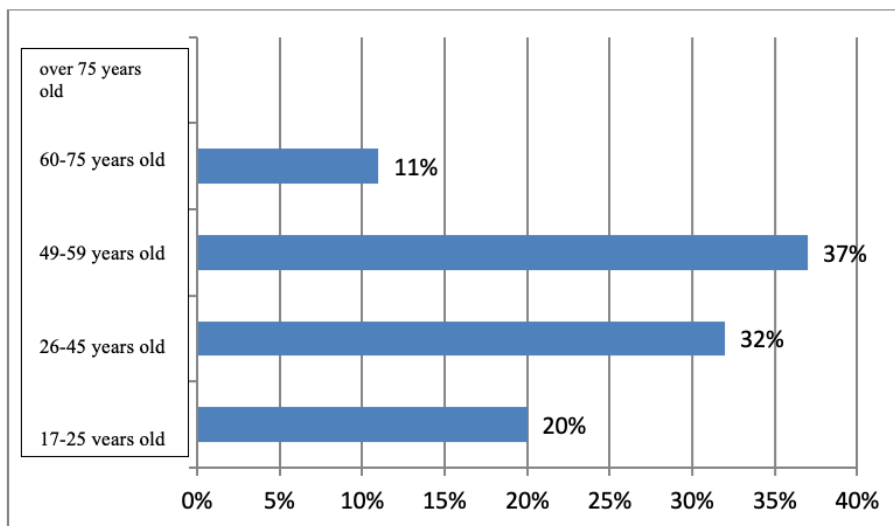


Figure 2 Characteristics of respondents by age, %.

Even though most of the respondents belong to the economically active age, 33% of them are unemployed (Figure 3).

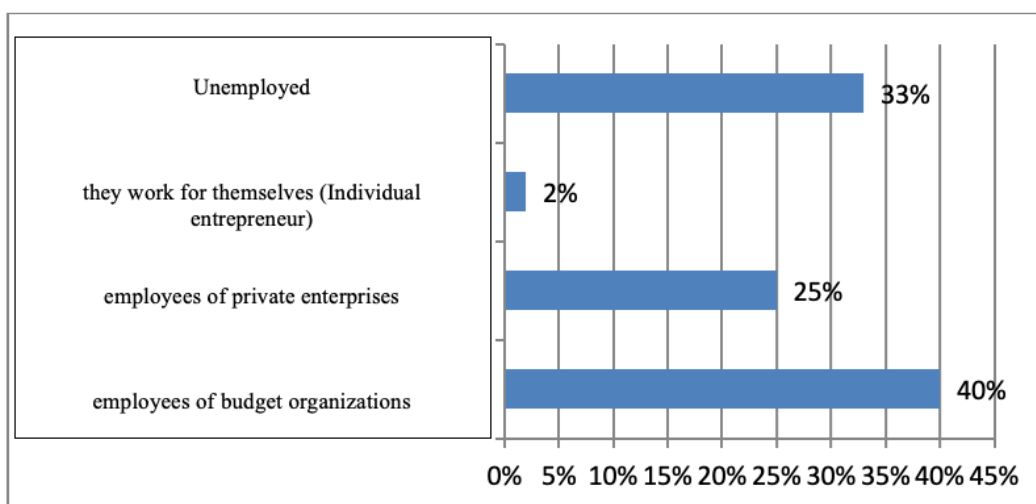


Figure 3 Characteristics of respondents by place of work, %.

Thus, the percentage of employed rural residents, according to the study, was 67%. Education level: 12% have higher education, 38% have specialized secondary education, 50% have secondary education.

The information obtained through the questionnaire about the positive factors contributing to the development of business in rural areas allows us to rank them as follows:

- * Low competition in the production of natural products, availability of free niches for this business (35%),
- * Proximity to Nur-Sultan (31%),
- * Availability of sufficient land resources for the cultivation of livestock and plant products (20%),
- * Availability of state programs of preferential lending to support businesses in rural areas (14%).

If we divide private households into three categories, depending on the degree of their participation in the sale of manufactured products, then we can distinguish "non-commodity" (produce products only for their own consumption, and sell it only with the occasional appearance of surpluses), "low-commodity" (produce products for their own consumption and the sale of surpluses), "high-commodity" (produce products primarily for sale and partly for their own consumption). As the study shows, this village is mostly represented by "non-commodity" and "low-commodity" private households. So, for example, only 25% are engaged in the sale of milk and dairy products, and 14% of the surveyed owners of private farms are engaged in the sale of meat. Most respondents cultivate poultry and plant products for personal consumption. These facts indicate the low entrepreneurial activity of the population.

To the question: "Have you tried to start your own business?" – 80% of respondents answered in the negative. At the same time, 64% of those who did start their own business tried to master the sphere of trade and socio-cultural services (shops, cafes, baths, etc.), 7% tried to grow vegetables, 7% – milk and dairy products, 22% – cattle fattening.

To the question: "What problems did you encounter when starting a business?" - respondents noted the following problems: lack of initial capital; no labour resources; limited access to bank products (credit, leasing, etc.); high cost of feed (the study showed that 93% of villagers buy feed and only 7% use their own harvested feed); lack of awareness and legal literacy in doing business.

As the results of the survey show, the owners of private farms need a wide range of educational and consulting services for startups and business development in rural areas. So, to the question: "Have you taken training courses on entrepreneurship and starting a business?" – 90% of the villagers answered in the negative. And to the question: "Would you like to develop a business in rural areas, if so, which one?" – 45% of respondents answered in the affirmative, giving greater preference to business development in the field of trade and socio-cultural services (shops, cafes, baths, etc.) (73%), fattening livestock (10%), growing vegetables (10%), milk production and dairy products (7%).

The analysis of the results of the survey of citizens engaged in private farming shows that there is a certain dependence of the level of development of private farming on the level of income of citizens. So, to the greatest extent, private households are developed among rural residents whose monthly incomes are above 80 thousand tenges. To expand small-scale production in private farms, additional financial investments are needed, which can be made if they are available. In general, there is a low level of income of the population in the studied region. Thus, 23% of villagers had income below 50 thousand tenge, 40% in the range from 50 to 80 thousand tenge, 22% above 80 thousand tenge and 15% of respondents had no income (Figure 4).

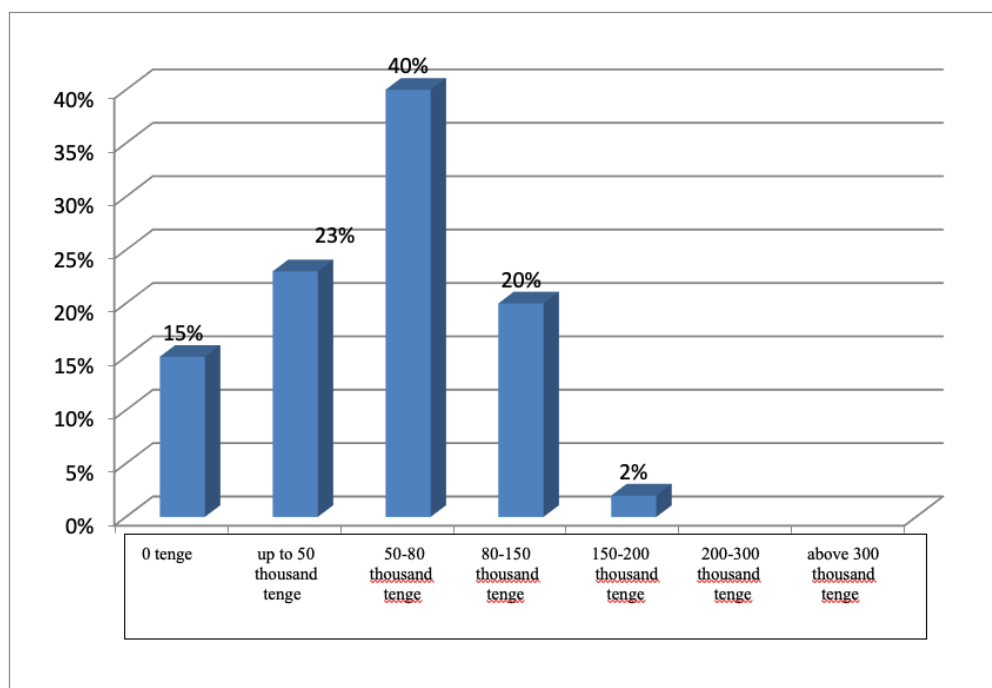


Figure 4 Respondents' income level, thousand tenges.

Low income, lack of initial capital, lack of availability of banking products, and bureaucratic "delays", according to respondents, are among the main factors (22%) hindering the development of business in rural areas. However,

the most significant deterrent factor is the underdeveloped infrastructure (there is frequent disconnection of water, electricity, and Internet), this was indicated by the majority of respondents (51%), Lack of awareness and legal literacy in doing business (17%) and the lack of a stable sales market (10%) they are also the main constraining factors of business development according to the villagers.

Based on the data of the survey, in this article, we propose a model for increasing the business activity of private households on the example of small-scale poultry meat production on farmsteads. (This model is undergoing three-year testing within the framework of grant funding from the Ministry of Education and Science of the Republic of Kazakhstan.)

The essence of this model is to create a platform and a mechanism that will directly connect stakeholders (Figure 4). And there are four of them in our model.

The first part is the private households (within the framework of the approbation, the private households of the village of Akhmetaul of the Nurinsky district of the Karaganda region were selected) who want:

- * Increase your income,
- * Open your own business in pilot mode,
- * Get help and advice from scientists,
- * Try a new kind of business,
- * To enter the city market with your products.

The second group of participants are urban residents, and investors (within the framework of the project, these are employees and teachers of KazATU named after S. Seifullin, Nur-Sultan), they pursue the following goals:

- * Get verified suppliers of fresh, environmentally friendly products,
- * Save on marketing tricks and inflated prices of intermediaries,
- * Get fresh ecological poultry meat products,
- * See how products are grown for them,
- * Support the villagers.

The third group of participants - suppliers of material and technical means (Astana-Kus LLP - chicken supplier, Alix LLP-feed supplier, Veterinary Pharmacy No. 1, Nur-Sultan) For this group, it is important:

- * New partners for the sale of their products, expansion of sales markets,
- * Fulfilment of contractual obligations by partners.

The fourth group is the University (Kazakh Agrotechnical University named after S.Seifullin, Nur-Sultan) For this group it is important:

- * Testing of the latest scientific achievements in technology,
- * Approbation of the mechanisms of interaction between the parties of the model,
- * Obtaining a prototype of a model for the development of personal subsidiary farms business activity.

The main link of this model is the OPERATOR who performs all the key roles of this model:

- * Selects personal subsidiary farms for work,
- * Looking for interested MTS suppliers,
- * Looking for interested urban residents-investors,
- * Selects scientific consultants for scientific support of the project,
- * Enters contracts with all parties to the project,
- * Is the main guarantor of the fulfilment of the terms of contracts,
- * Organizes transportation of finished products and means of production to places,
- * Does all calculations for the model and for the project as a whole,
- * Organizes training and transfer of knowledge and technology in general,
- * Monitors the fulfilment of obligations of all project participants,
- * Conducts financial collection of investments and purchases materials and means of production for all parties to the project.

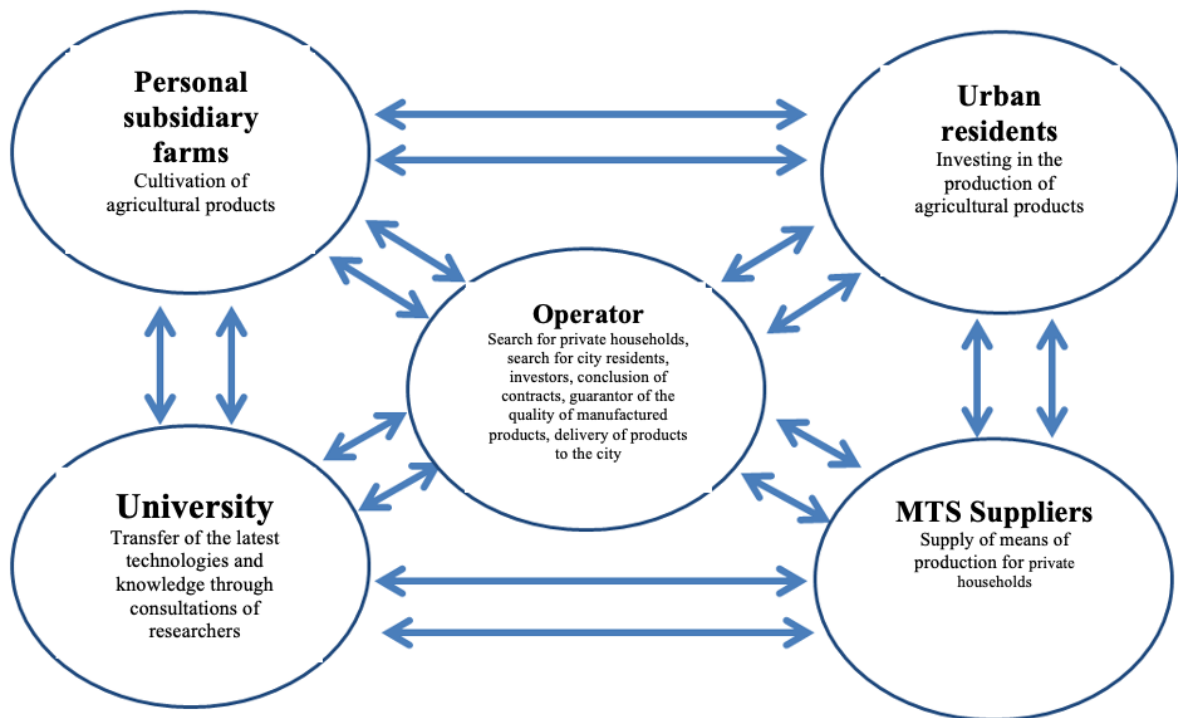


Figure 5 Mechanisms of interaction of the parties in the creation model.

The greatest interest in this model is caused by the financial model and the financial mechanism of interaction between the parties.

The financial model calculation methodology

To begin with, we will determine the total amount of funding:

1. Determine the volume of livestock, which should be no less than the break-even point:

$$P_o = P_u + P_x + P_{\text{Cattle deaths}} \tag{1}$$

Where:

P_o – total livestock, head; P_u – the livestock that will go to the investor is 60% of the P_u ; P_x – the livestock that will remain as a payment for the work and expenses of the private farm is 30% of the P_o ; P – the expected case of a bird is 10% of the P_o , if the case is less, then the proportion of P_u increases, if the case is more than planned, then the proportion of P_x decreases.

2. We determine the upcoming costs:

$$E_{tc} = E_y + TC_y + E_{feed} + TC_{feed} + E_{vet} + TC_{vet} + E_{slaughter} + TC_{prod} + E_{serv} + E_{expenses} \tag{2}$$

Where:

E_{tc} – total costs, units; E_y – costs for young animals; TC_y – transportation costs for the delivery of young animals; E_{feed} – feed costs; TC_{feed} – transportation costs for the delivery of feed; E_{vet} – costs of veterinary drugs; TC_{vet} – transportation costs for the delivery of veterinary medicines; $E_{slaughter}$ – the cost of slaughtering a grown bird; TC_{prod} – transportation costs for the delivery of finished products to the city; E_{serv} – costs for the services of specialists; $E_{expenses}$ – other costs.

3. We plan the optimal productivity of poultry, it depends on the cross of broilers (in our case, Cobb-500 and Arbor Aikres) and to a greater extent on the conditions of keeping on farmsteads, we settled on the value of 2.2 – 2.3 kg in slaughter weight.

4. We consider the planned price of meat for urban residents.

$$C = E_{tc}/P_i * \text{weight gain} \tag{3}$$

Where:

C – the price of one kilogram of meat for investment calculations.

As shown by 3 years of testing, the price of poultry meat is on average 15% lower than the market price of farm poultry sold in the city of Nur-Sultan.

5. We determine the amount of financing that city residents will invest in the project

$$F_i = \sum P_i * C \quad (4)$$

Where:

F_i – the volume of planned financing by the i -th investor, units; P_i – the volume of purchased products by the i -th investor, kg; C – estimated price of one kilogram of meat.

Practice shows that the amount of financing by one city investor corresponds to an average of 22 – 23 kg of meat. The main mechanism of financial interaction is built on a contractual basis between the participants of the model and is an integral part of the general mechanism of interaction.

The present linear (take-make-waste) model of economy representing as well with textile and clothing industry has a slight chance of effectively adopting sustainable development principles. In recent decades, clothing production has significantly changed and has grown into a Fast fashion trend characterized by mass production of clothes, low prices, and their short life cycle. It is essential to support sustainability, circularity, and resource efficiency of materials, processes, and overall business operations in this sector. The paper deals with the issue of the negative environmental, social, and economic impact of the clothing industry on society. To better understand the situation on the market paper analyses and evaluates consumer behaviour in the clothing industry through the results of a questionnaire survey. Draws attention to the negatives of the linear economy model and proposes solutions to mitigate the negative impact of the clothing industry on the environment and society through education, stricter legislation, simplification of the certification process, support, and promotion of organic production, and highlighting the need to move from linear to the circular economy. Mitigating the negative impact of the clothing industry is essential to achieving sustainable living conditions [16]. Consumption is among the key determinants of milk production and profitability. The main purpose of this paper is to present the level of and changes in milk and dairy products consumption in the EU from 2004 – 2018. Due to changing consumer preferences, the average consumption of milk and milk products in EU countries is on an increase. In turn, Poland witnessed a growth in the consumption of milk for ripening and processed cheese and yoghurt. From 2004 – 2017, per capita consumption of ice cream, cheese and powdered milk followed a downward trend. To examine changes in the consumption of milk and milk products, a forecast was prepared which shows that in 2018 – 2022, Poland will experience an increase in the average monthly consumption of milk, ice cream and cheese. On the other hand, the EU will report growth in consumption of fresh dairy products, butter, cheese, skim milk and powdered milk, and a decrease in casein consumption [17]. There has been increasing awareness of the benefits of healthy and organic food products as more knowledge has been gained on their effects on health, environment, social convenience, and sustainable development. Acquiring insight into consumer attitudes is essential for the industry to grow. Compared with the rest of the world, the Kurdistan region of Iraq is still in the early stages of understanding the importance of healthy and organic food products. The study's aim was to investigate the attitudes of Kurdish consumers concerning healthy and organic food. I administered an online survey to 452 respondents, and their responses were analysed by using descriptive statistics and performing correlation, linear regression, and factor analysis. The findings indicated that health concerns were the main reason for healthy and organic food consumption. I also found that quality and taste were important factors in purchasing decisions and that consumers were willing to pay a premium price if these foods were available. However, there was a general lack of concern about food production's effects on the environment and animal welfare. This research provides new insight into the attitudes of Kurdish consumers in Iraq towards healthy and organic food. This population has not been covered before, which will add to the literature on this subject [18]. The present paper reviews and analyzes existing models, providing an intact point-of-view by integrating key elements into a bigger framework. Key determinants of general food choice are identified and categorized, including food-internal factors (sensory and perceptual features), food-external factors (information, social environment, physical environment), personal-state factors (biological features and physiological needs, psychological components, habits and experiences), cognitive factors (knowledge and skills, attitude, liking and preference, anticipated consequences, and personal identity), as well as sociocultural factors (culture, economic variables, political elements). Moreover, possible directions of influence among the factors towards final food choice were discussed. The need for multidisciplinary

impulses across the research field with the support of empirical data is crucial for understanding factors influencing food choice and enriching existing conceptual models. The framework proposed here would serve as a roadmap for facilitating communications and collaborations between research fields structurally and systematically [19]. These include strong global competition and continuous changes in consumer perceptions about food safety, animal welfare and environmental protection. The loss of consumer confidence and trust in the quality and safety of poultry meat and poultry products will remain a major challenge. Many human foodborne bacterial infections are linked to poultry. Control and elimination of these organisms present a great challenge. The development of antibiotic-resistant bacteria will also be a continuous public health hazard. The future concept of animal health will cover not only the absence of disease in birds but also the relationship between the health of animals and their welfare. It will also consider social, economic and ethical considerations and support the achievement of a high level of environmental protection. The emergence and re-emergence of infectious turkey diseases will remain an important non-ending challenge [20]. Current lifestyles always pose increasing time pressure that can result in unhealthy diets. Our study addresses the role high-quality plant-based convenience foods can play in promoting healthier consumption. While convenience foods are often associated with poor nutritional values, the spread of healthy convenience foods could respond to the needs of new lifestyles and promote better food choices. The study is based on a multi-component model of the Theory of Planned Behaviour that has made it possible to verify how control factors such as cooking skills, product availability, budget, time pressure, and interest in healthy eating can affect the consumption precooked plant-based foods. The results of Structural Equation Models applied to a sample representative of the Italian population (600 individuals) highlight a consistent group of consumers (almost 70%) that consider plant-based convenience foods as a useful means to improve their diet. For this cluster, market availability, interest in healthy eating, and time pressure are the control factors that significantly influence behaviour. The advancements in knowledge that this research produces are translated into guidelines for producers, retailers, and policymakers that, in synergy, might encourage consumers to replace unhealthy foods with healthy ones [21]. The global human community is facing an increasingly urgent dilemma: How do we improve living standards while lessening our environmental impact? This special issue presents recent contributions from psychological and interdisciplinary research on sustainable consumption. To situate these articles in a broader context, we first establish the necessity of improving sustainable consumption and discuss some foundational psychological work addressing this issue. Second, we outline how sustainability can be addressed at various stages, from production and marketing to consumption and waste. Third, we stress the need to broaden the focus on individual consumption to include collective action. Fourth, we discuss several critiques of past research on sustainable consumption. Finally, we highlight the importance of interdisciplinary research in supporting sustainable development. These themes are addressed in greater depth by each contribution to the special issue [22]. Reward systems are being described with a new conceptual approach where liking—the pleasure derived from eating a given food—and wanting—motivational value, desire, or craving—can be seen as the significant forces guiding eating behaviour. Our work shows that pleasure (liking), desire (wanting), and the interaction between them influence good predictors of food choice and intake. Reward responses to food are closely linked to food choice, inducing caloric overconsumption. Based on the responses to a self-administered questionnaire measuring liking and wanting attitudes, we found three different segments: 'Reward lovers,' 'Half Epicurious,' and 'Non-indulgents'. Their behaviour when choosing food is quite different. Results show differential effects on caloric consumption depending on segments. Introducing more food choices that try to balance their content is a win-win strategy for consumers, companies, and society [23]. Global food systems are currently challenged by unsustainable and unhealthy consumption and production practices. Food labelling provides information on key characteristics of food items, thereby potentially driving more sustainable food choices or demands. This review explores how consumers value three elements of sustainable diets: Comparing consumer response to nutrition information on food labels against environmental and social responsibility information. Six databases were systematically searched for studies examining consumer choice/preference/evaluation of nutrition against environmental and social responsibility attributes on food labels. Studies were quality assessed against domain-based criteria and reported using PRISMA guidelines. Thirty articles with 19,040 participants met inclusion criteria. Study quality was mixed, with samples biased towards highly-educated females. Environmental and social responsibility attributes were preferred to nutrition attributes in 17 studies (11 environmental and six social), compared to nine where nutrition attributes were valued more highly. Three studies found that a combination of attributes was valued more highly than either attribute in isolation. One study found no significant preference. The most preferred attribute was organic labelling, with a health inference likely. Consumers generally have a positive view of environmental and social responsibility food labelling schemes. Combination labelling has potential, with a mix of sustainable diet attributes appearing well-received [24]. This study investigated stakeholders' perceptions of animal welfare issues in the Chinese transport and slaughter industry using utility scores and adaptive conjoint analysis. An initial workshop for experts in this

field identified key concerns; these were then included in a questionnaire distributed electronically to stakeholders. Stakeholders, particularly those with higher levels of education, were most concerned about the absence of pre-slaughter stunning and failure to maintain unconsciousness throughout the slaughter process. For all livestock species, electrical stunning was considered the best method of stunning and blunt trauma the worst; for cattle and sheep, stunning using a penetrating captive bolt was considered preferable to the use of a percussive captive bolt. Other important concerns were journey quality and livestock workers' experience and attitudes. Heat stress and closed-sided vehicles were of greater concern than cold stress. Loading facilities and journey length were considered of intermediate importance, while lairage and methods for catching chickens were of the least concern [25]. Mortality of broilers during transport and lairage before slaughter represents an economic loss to the poultry industry and a welfare issue that needs to be addressed. In Canada, broilers can be transported long distances and exposed to environmental factors, such as cold temperatures, affecting the percentage of dead-on-arrivals or DOAs. Slaughter plant records for loads transported over 19 months in 2009 – 2010 were examined to identify factors affecting mortality risk (% DOA) during transportation from the rearing barn to the slaughter plant. Information from 2007 loads was analysed using a multilevel linear model. Most of the variation in the mortality risk occurred at the load level rather than at the producer or barn level. There were significant effects of bird sex, age and weight, catching team, journey duration and holding barn duration on mortality risk. The following environmental risk factors increased mortality risk: cold temperatures during the journey and in the holding barn, soft crate stocking density during journeys at cold temperatures and increased trailer temperature when in the holding barn [26]. This study aimed to identify welfare problems occurring during the consecutive stages of commercial broiler transportation and to identify risk factors associated with the identified welfare problems. Commercial Belgian transports ($n = 81$) were assessed in spring ($n = 14$), summer ($n = 33$), autumn ($n = 10$), and winter ($n = 24$), and potential risk factors were recorded by the observer. Animal-based welfare indicators were scored before the start of the pre-slaughter phase and after the catching, transport and lairage, and slaughter stages to assess the impact of each stage. The most frequently observed welfare impairments were vent and thigh lesions, panting, wing fractures, and bruising on wings and breasts. Our results show that the impact of the pre-slaughter phase on broiler welfare is multifaceted. The overall pre-slaughter phase resulted in a mean weight decrease of 5.3%, a prevalence of 1.4% in leg bruising, and 3.7% in breast or wing bruising. Wing fractures occurred mainly during the catching stage: Prevalence increased from 0.1% to 1.9% ($p = 0.003$). A welfare comparison before and after transportation and lairage revealed that plumage had become more soiled ($p = 0.003$), body temperature decreased by 0.7 °C ($p < 0.001$), huddling prevalence increased by 0.5% ($p = 0.008$), prevalence of birds with splayed legs increased by 0.08% ($p = 0.008$), prevalence of supine birds decreased by 0.05% ($p = 0.003$), and 0.1% fewer birds with wings stuck in the crates ($p = 0.010$) were observed. Risk factor analyses revealed that carefully choosing the catching crew, minimising thermal stress, reducing the duration of transportation, and worker training are promising actions that may improve broiler welfare during the pre-slaughter phase [27]. This study will review the environmental implications of dynamic policy objectives and instruments outlined in the European Union 7th Framework Programme (EU-FP7) Project DYNAMIC policy MIXes for absolute decoupling of EU resource use from economic growth (DYNAMIX) to address reductions in food consumption, food waste and a change in waste handling systems. The environmental implications of protein intake, food waste reduction, food waste management and donations are addressed using a life cycle approach to find the greenhouse gas (GHG) emissions, land use and water consumption. Data are provided from the Statistics Division of the Food and Agriculture Organization (FAOSTAT) food balance sheets for the European Union (EU) with the base year of 2010 and life cycle inventory (LCI) data from a meta-study of available GHG, land use and water consumption data for major food products. The implications are reviewed using several scenarios for the years 2030 and 2050, assuming policy instruments are fully effective. Results indicate that reductions in animal-based protein consumption significantly reduce environmental impacts, followed after that by reductions in food waste (assuming this also reduces food consumption). Despite the positive implications the policy mixes may have for targets for decoupling, they are not enough to meet GHG emissions targets for the EU outlined in the DYNAMIX project. However, land and water use have no significant change compared to 2010 levels [28]. Growing population and increased demand for food, inefficient resource use and distribution, environmental impacts, and high rates of food wasted at all stages of the food system are all calling for the transition towards more sustainable practices. In this article, we apply the concept of circular economy to the case of a sustainable food system. Furthermore, we explore the transition towards a circular food system through the lens of socio-technical transition theory towards sustainability. We discuss challenges and potential solutions for the production stage (focusing on nutrient flow), the consumption stage (focusing on meat consumption), and food waste and surplus management and prevention [29]. Food consumption outside the home is a growing phenomenon rapidly gaining importance in terms of its impact on both consumers and the food system. This paper presents an innovative tool for measuring the sustainability of food intended for public consumption in organisations such as

schools, hospitals and workplaces. Drawing on an in-depth review of the food sustainability literature, the FOODSCALE method quantifies eleven sustainability categories that cover thirty-six food sustainability indicators. Several characteristics distinguish the FOODSCALE method from other food sustainability assessment tools. First, it covers the three dimensions of sustainability – society, economy, and environment – treating these as interdependent and coexisting. Secondly, it considers the entire food system, thus incorporating aspects of production, distribution, procurement, consumption and waste disposal. Cross-cutting health and human agency themes complement the eleven specified categories to present a holistic assessment of food sustainability. The tool helps identify good practice and areas for improvement and points toward specific measures for increasing food sustainability. Following a detailed discussion of the tool, the paper presents the results of a comparative study of eight cases across five organisations in the Republic of Ireland. Results show significant differences in sustainability performance across cases and within organisations. The role of key decision-makers in organisations and possible intervention points are highlighted in the discussion [30]. In the context of "2014-European Year against Food Waste" and the EU project FUSIONS, a study has been conducted in a first attempt to define, describe and quantify food losses and waste from harvest to retail in various food supply chains in France. The present communication focused on meat of the Gallus species, i.e. meat of chicken and culled laying hens. In the present study, food losses were defined as products discarded from human consumption for sanitary reasons: mortality between harvesting and stunning and condemnation at the slaughterhouse. Food waste was defined as any part of the animal which is edible or could, after processing, be eaten by humans yet used for other purposes, such as pet food. The study drew in diagrams of the different technical tracks from the live animal to the end product, with the various associated by-products coming out along the slaughter and processing lines and valorisation. Determinants for food losses and waste were either technical, such as technical characteristics of processing tools, economic, such as the market demand side, regulatory or organisational, such as shelf management at retail concerning products' expiry dates. Quantifying food losses and waste is difficult due to the personal character of business data. Issuing from the representation of the different slaughter and process steps, a calculation sheet has been implemented to estimate the share of food losses and waste according to various hypotheses, such as e.g. percentage of carcasses devoted to cutting or percentage of giblets valued for human consumption. The stages of marketing and retailing remained, however poorly documented. This preliminary study needs to be discussed with a larger professional audience and challenged by further research on this topic to increase public attention [31]. The average mortality for end-of-lay hens dead on arrival (DOA) was 0.27 per cent (median 0.15 per cent) in a survey of 13.3 million hens transported in 2009. A statistical data model indicated main risk factors for DOA to be slaughter plant, distance travelled and external air temperature, with longer journeys and low external air temperatures increasing the risk. Other highly significant risk factors ($p < 0.001$) related to the condition of the birds on the farm, where an increased risk of DOA was positively associated with poor feather cover, lower body weight, cumulative mortality of the flock and poor health (indicated by a high proportion of the load rejected at the plant for traumatic injury and disease state). However, the data indicate that taking risk factors into consideration makes it possible to transport hens up to 960 km with low losses in temperate conditions. Mean levels of on-farm mortality, during the laying period, for a total of 1486 flocks were significantly lower in cages (5.39 per cent) than in barns (8.55 per cent), free-range (9.52 per cent) or organic flocks (8.68 per cent) according to producer records a median of seven days before depopulation, with considerable variation between flocks in all systems [32]. Standardised data on husbandry were recorded for a flock of birds in one house on each of 150 broiler farms in the UK during the 4 d before slaughter.

2. For each flock, the incidence of birds found dead on arrival (DoAs) and the Meat Hygiene Service carcass rejection records were recorded at the slaughterhouse.

3. The mean percentage of birds in each flock found DoA was 0.12% (range 0 – 0.64%), and the mean percentage of Total Carcass Rejects (TCRs) for each flock was 1.23% (range 0.07 – 5.51%). 4. A general linear model was developed to examine factors associated with flock percentage DoAs. Assuming a linear relationship, all other factors remaining the same, a one percentage point (PP) increase in small/emaciated birds will result in a 0.155 PP increase in DoAs and a 1 PP increase in wheat in diet four will result in a 0.003 PP decrease. An increase by one in the total number of vaccines administered will cause a 0.029 PP decrease in DoAs, a 1 g increase in live weight at slaughter will be associated with a 0.000043 PP increase, and a 1 PP increase in mortality on the farm would be associated with a 0.000044 PP increase. A 1 PP increase in Ross birds decreases DoAs by 0.0004 PPS: there is also a seasonal effect [33]. Food waste in the global food supply chain is reviewed about the prospects for feeding a population of nine billion by 2050. Different definitions of food waste concerning the complexities of food supply chains (FSCs) are discussed. An international literature review found a dearth of data on food waste, and estimates varied widely; those for post-harvest grain losses in developing countries might be overestimated. As much of the post-harvest loss data for developing countries was collected over 30 years ago, current global losses cannot be quantified. A significant gap exists in understanding the food waste implications of the rapid

development of 'BRIC' economies. The limited data suggest that losses are much higher in developing countries at the immediate post-harvest stages and higher for perishable foods across industrialised and developing economies. For affluent economies, post-consumer food waste accounts for the greatest overall losses. To supplement the incomplete picture and to gain a forward view, interviews were conducted with international FSC experts. The analyses highlighted the scale of the problem, the scope for improved system efficiencies and the challenges of affecting behavioural change to reduce post-consumer waste in affluent populations [34]. This observational study was conducted to identify the cause of death and load level factors associated with mortality in 1 090 733 Manitoba broiler chickens transported to slaughter in spring and early summer. Death loss in transit was 0.346% and accounted for 19% of the total carcass condemnation. The death loss pattern was bimodal, with a low death loss in 180 of 198 shipments. Cumulative death loss during the growing phase of production was consistently associated with increased transport mortalities in load level models and when comparing high death loss with low death loss truckloads. The high ambient temperature at the time of slaughter and the loading density of the truck were the major factors associated with exceptional death loss [35]. This observational study was conducted to identify the cause of death and load level factors associated with mortality in 1 090 733 Manitoba broiler chickens transported to slaughter in spring and early summer. Death loss in transit was 0.346% and accounted for 19% of the total carcass condemnation. The death loss pattern was bimodal, with a low death loss in 180 of 198 shipments. Cumulative death loss during the growing phase of production was consistently associated with increased transport mortalities in load level models and when comparing high death loss with low death loss truckloads. The high ambient temperature at the time of slaughter and loading density of the truck were the major factors associated with exceptional death loss [36]. The incidence of dead on arrival (DOA) birds were surveyed over 33 broilers, 11 turkeys, and 19 spent hen abattoirs representing the majority (around 70%) of the Italian poultry slaughter plants. Data were recorded monthly during a 4-yr period (August 2001 to July 2005), considering a total of 1266 million chicken broilers, 118 million turkeys, and 54 million spent hens, representing 67.7, 84.0, and 28.4% of the national production, respectively. The overall average incidence of DOA was found to be 0.35, 0.38, and 1.22% in broilers, turkeys, and spent hens, respectively. The season significantly ($p < \text{or} = 0.01$) influenced the mortality of all considered poultry categories, with the higher incidence being observed during the summer (0.47, 0.52, and 1.62% for broilers, turkeys, and spent layers, respectively). The incidence of DOA broilers was lower in small slaughter plants compared with medium and large slaughter plants (0.28 vs 0.38 and 0.35%, $p < \text{or} = 0.01$). The data obtained in this study might be used for establishing limit values of DOA as a welfare indicator during the preslaughter time of birds, including catching, loading, transportation, and lairage [37]. A field trial was conducted to compare the manual catching of broilers with a mechanical catching method. Both methods were compared concerning the incidence of bruises and dead on arrival, stress parameters, and meat quality. Also, the dynamics of corticosterone, glucose, and lactate were investigated on the day broilers were killed. The broilers originated from 8 commercial broiler farms; visits were made on the day of catching during the spring and autumn of 2001. Broilers of one house were caught manually, and those of the second house was caught mechanically. Plasma samples were taken before catching started, 30 min after the start of catching, 30 min before the end of catching, and at exsanguination of broilers from the first- and last-loaded transport vehicles. Postmortem measurements of pH, temperature, and water-holding capacity were made. Mechanical catching was associated with higher DOA percentages than manual catching in spring, although the difference was not significant in autumn. The catching method did not influence the percentage of bruises or meat quality. Moreover, corticosterone levels indicated that both methods induced the same amount of stress. The dynamics of corticosterone, glucose, and lactate levels showed a similar pattern. Plasma levels increased at the start of catching and increased during transport, shackling, and stunning. However, during catching itself, no large changes were observed. Our findings indicated that attempts to reduce stress in broilers during the last day of life could better be focused on factors other than catching [38]. The catching of broilers is the first stage in the transfer of birds to the slaughterhouse. The catching process entails a high risk of stress, injury, and bird death. Associated injury and mortality rates have important implications not only for animal welfare but also for the economics of the procedure. Catching machines are advantageous for labour costs and standards and may also reduce damage to the birds. In the present investigation, a sweeper-type catching machine was compared with manual catching under commercial conditions. Data were collected during 43 mechanical and 40 manual catching events evenly distributed over one year. Dead-on-arrival rates were recorded, and 108 068 mechanically caught and 87 916 manually caught birds were examined for injuries on the shackles at the processing plant. Injury rates of all types were significantly reduced after mechanical catching. This improvement was biggest concerning leg injuries. There was no significant difference in the number of dead-on-arrivals except during the spring period when there were higher losses of birds caught mechanically; this was thought to be attributable to climatic conditions. The loading of the transport containers with equal numbers of birds and the initial familiarisation period of the catching team with the machine is potentially problematic factors with potential for improvement. The catching machine

investigated here, with its lower risk of injury to broilers than commercial manual catching, has the potential to limit the impairment of bird welfare during catching [39]. Animals may be subjected to various stressors during transport, which may compromise their health, welfare, and meat quality. In the chain of operations between a farm and a slaughterhouse, animal transport is probably the most stressful and injurious stage. Data on mortality is commonly collected at slaughterhouses as a retrospective indicator of animal welfare during transport. Ten-year prevalence of mortality of all the species and categories of animals (cattle, pigs, goats, sheep, poultry, rabbits and ostriches) regularly scheduled for slaughter in the Czech slaughterhouses was assessed as dead on arrival after road transport from 2010 to 2019. Among livestock, the highest mortality was found in pigs (0.065%), statistically higher compared to cattle (0.027%) and sheep (0.015%). In animals shipped in containers (rabbits, broiler chickens, end-of-lay hens, turkeys, geese and ducks), the highest prevalence was found in laying hens (0.507%), statistically higher compared to broiler chickens (0.425%) and rabbits (0.199%). The lowest prevalence was observed in geese (0.003%). There was a trend for decreasing death losses of pigs in recent years, and losses in broiler chickens and ducks increased. The results indicate that the current transport conditions should be re-evaluated for poultry. Emphasis should be put on the assessment of animal fitness before transport. This is especially important for animals such as dairy cows, sows, and laying hens at the end of their production cycle. They were more likely to die during the journey [36]. Groups of 15 broilers aged 32 to 33 d were exposed to an air stream regulated to -5, -10, or -15 °C. Birds were placed into a typical transport drawer. Following baseline observations, the drawer was placed into a test chamber where cold air was drawn past the birds for three h. Three replications were conducted at each temperature. The birds adjusted their position within the drawer based on the drawer's temperature distribution. Compared to the baseline period, exposing the birds to a cold air stream caused them to avoid the front plane ($p = 0.003$), which was the coldest area within the drawer. The birds did not adjust their usage of the middle ($p = 0.308$) and rear ($p = 0.640$) planes because these were the warmer areas within the drawer. The total amount of space the birds occupied within the drawer did not decrease when exposed to the test chamber ($p = 0.669$). The core body temperature (CBT) did not vary and was within the known normal range during the normal ($p = 0.528$), pre-chamber ($p = 0.060$), and post-chamber ($p = 0.285$) periods. The CBT of the birds significantly decreased during the in-chamber period ($p < 0.001$) and then increased during the lairage period ($p < 0.001$). The shrink loss ($p = 0.981$) and amount of time to resume feed consumption ($p = 0.357$) were not affected by exposing the birds to temperatures of -5 °C and colder. Exposing birds to temperatures of -5°C and colder hurt the CBT of the birds. However, the birds demonstrated behaviours which mitigated the negative effect that cold exposure could have on their CBT [40].

CONCLUSION

Personal subsidiary farms, not enterprises, have become the primary and most widespread forms of economic activity of the rural population of the republic. They are focused on producing agricultural products to meet the needs of the people in food. The business activity of personal subsidiary farms acts as a means of solving the tasks of ensuring the food security of the republic and the preservation and development of rural areas, rural lifestyle, national life and cultural heritage in general. It is necessary to create the conditions for orienting private households to entrepreneurial activity. And as an example, the article cites the current model of increasing the business activity of personal subsidiary farms developed by the authors, which is based on small-scale poultry meat production. Following it, the project's financial model is presented in the article. The main driving force of this model is the OPERATOR. This project team conducts all the project coordination activities, providing the project's main participants to engage in their core activities. Of particular interest is the financial model of this project, which was developed by the project's authors and tested for three years. This model allows you to reduce the price of finished products and keep it 15% below the market. The project showed that personal subsidiary farms without special conditions could not transform massively into individual entrepreneurs or peasant farms. To do this, the state needs to organise prototypes of such operators on the ground, which will begin to perform all intermediary functions to improve the business environment of each rural locality.

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