ТЕХНОЛОГІЯ ВИРОБНИЦТВА І ПЕРЕРОБКИ ПРОДУКЦІЇ ТВАРИННИЦТВА

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Comparative study on the sustainability of cattle products in the North-East cross-border region of Romania

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In this paper, the sustainability of cattle production in the cross-border region of North-East Romania and the Odessa region, Ukraine was pursued. The working methods used in this research were: observation, information systematization, mathematical-statistical method, and scientific explanation.

The average milk production on lactation and on the breeds in Romania varied as follows: Transylvanian Pinzgau breed (PT) – 4118–4724 kg milk, Brună breed (B.) – 3543–5211 kg milk, Bălțată Românească breed (BR) – 2833–5519 Kg milk, and Bățlată cu Negru Românească breed (BNR) – 4.322–6.332 kg milk. Regarding the meat production, in 2016 it was 206 thousand tons live weight at slaughter, which increased by 6 thousand tons compared to 2015 when meat production was 200 thousand tons live weight at slaughter.

The average milk production per cow in the Odessa region was 3.577 kg in 2014, down 262.0 kg compared to 2013, and by breed it was as follows: Red Ukrainian- 4.215 kg, Black Ukrainian spotted 4.665 kg, and Red Steppe with 3.394 kg milk. Also, meat production in 2014 was 32.203 kg, and in 2013 – 35.233 kg, with 3.030 kg less or 8.6 %.

In the cross-border area of Romania as well as in the cross-border area of Ukraine in the analyzed farms, with large or family-type farms, the allowance of production factors is under necessity, the current conditions, especially financial, allowing only the use of certain production factors (breed, feed). If in Romania, the European funding contributes to achieving the sustainability of cattle production, in Ukraine, farmers face major deficiencies.

Key words: cattle, production, milk, meat, sustainability, cross-border.

Problem statement and analysis of recent research. Sustainable animal husbandry refers to those practices that promote economically viable, environmentally friendly methods and take into account public health issues. It is necessary for animal husbandry to focus on other aspects, apart from the economic one, in order to create conditions that benefit not only us, but also the following generations [1, 2, 3, 4, 5, 6].

Regarding this purpose, on 1st of October 2013, the 90% European funding contract of the MIS ETC 1549 cross-border project was signed, which involved three universities, as the University of Agricultural Sciences and Veterinary Medicine of Iași Romania, State Agrarian University from Odessa, Ukraine, and the State Agrarian University of Chișinău, Republic of Moldova. The overall objective of the project was to improve the

economic performance of the border area through speeding up and modernizing a sustainable agriculture. Other special objectives were specified by each stage of the project, as follows: creating a common network of quantitative and qualitative cattle production monitoring centers in the partner countries; the development and implementation of a software tool for monitoring milk quality and meat production; carrying out 2 pilot farms for quantitative and qualitative determinations in Romania and in the Republic of Moldova, but also conducting a cross-border study on production and good practices in cattle breeding [6, 7, 8, 9, 10, 11]. Thus, after the completion of the study, results were obtained and conclusions were formulated that helped in making decisions on the sustainability of production and good practices in cattle breeding [7, 12, 13, 14, 15].

In this paper, we present some of the results obtained in the Romania and Ukraine cross-border area.

Material and methods of research. The research was conducted in the cross-border area of Romania and Ukraine [8, 14, 16]. During this time, the following were analyzed: the cattle breeds exploited in this area, the number of cattle, the type and size of the farms, the technical endowment of the farms, the animal welfare rules, the level and quality of the obtained productions, the main reproduction indicators. In milk production we examined the amount of milk, the fat percentage, and the milk protein, and as indicators of reproduction we followed the age of first calving, calving-interval and breast rest [5, 6, 8, 13, 17].

The primary data were extracted from the records of the holdings, but also from the records of the administrative offices. They have been systematized, statistically processed and interpreted by methods specific to such research. The statistics, as the parameters, which characterize a normal distribution, are on the one hand the average, and on the other hand the dispersion indices represented by the variance and the standard deviation of the pursued character. Statistics are noted in Latin letters: arithmetic mean ($\bar{X}$), variance (s^2), standard deviation (s), and parameters in Greek letters: theoretical average (μ), variance ($ó^2$), and standard deviation ($ó$). The S.A.V.C. computer program was used for this purpose (Statistics Analysis of Variance and Covariance 2003) to determine the arithmetic average ($\bar{X}$), the error of the arithmetic average ($\pm s$) the standard deviation (s), the coefficient of variability (V%) and the ANOVA significance tests as p [2, 8, 14, 18, 19].

It should be noted that the data analysis was performed in terms of merging and correlating with the numerous observations made directly on farms and with the reporting of the results obtained to the requirements and rules of the European Union (EU).

Research results and discussions. The study carried out in the Eastern cross-border area of Romania revealed that out of the diversity of traditional cattle breeding systems, the most widespread is the system is represented by the mixed animal husbandry on pastures near villages and accommodation in their own households.

Family-type farms are the structural organizational variant to which most individual farms will tend. These structures of agricultural production will assert themselves as the concentration and modernization of production become more agricultural units that produce mainly for marketing.

In the cross-border area, 80% of cows are currently raised on individual farms and 20% on farms with productive labor. The herds of cows in this area do not exceed the normal work capacity of a family, being located between two limits: a minimum at 5 UVM and a maximum 15 - 20 UVM.

The milk production at national level in Romania, on total sectors had a volume of 42,600.2 thousand hl, of which 42,503.7 thousand hl (99.78%) in the private sector and 96.6 thousand hl (0.22%) in the state sector. Depending on the number of cows that contributed to this total milk production, there is an average production of 3385 liters / head, with significant differences between the state sector (4273 liters / head) and the private sector (3384 liters / head).

In farms in the eastern cross-border counties of Romania, performance can be improved and brought as close as possible to what is obtained in countries with advanced animal husbandry. The best results were achieved in Vaslui and Iaşi counties (table 1).

The table 1 reveales that in Vaslui county were obtained average productions of over 5000 Kg of milk per real lactation, in breeds as Bălțată cu Negru Românească (BNR), Bălțată Românească (B.R.), and Brună (B.). The best performance was recorded by the Bălțată cu Negru Românească (BNR) breed with 5771 kg of milk, 3.84% fat, 3.28% protein. The national level shows that the same breed achieved an average lactation of 5505 kg of milk, with 3.83% fat and 3.27% protein. In the five cross-border counties studied, the average milk production per lactation and per breed varied as follows: Transylvanian Pinzgau (PT) breed - 4118 - 4724 Kg milk, Brună breed (B.) - 3543 - 5211 Kg milk, Bălțată Românească (BR) - 2833 - 5519 Kg milk, and Bălțată cu Negru Românească (BNR) - 4322 - 6332 Kg milk.

Table 1– **Production indicators of breeds from Romanian counties**

Specification	Breed	Number of individuals	Real production			Lactation length (days)	Calving-interval (zile)	Breast rest (days)
			Milk (kg)	Fat %	Protein %			
ROMÂNIA	Cattle	73249	5015	3,87	3,27	329	408	67
	B	8616	3950	3,80	3,25	325	405	61
	BR	29968	4661	3,92	3,27	322	401	70
	PT	179	4188	3,88	3,25	304	356	59
	BNR	34485	5505	3,83	3,27	336	416	65
	SST	1	3941	3,91	3,48	242	0	0
BOTOŞANI	Cattle	2414	4384	3,96	3,18	323	396	54
	B	19	4627	3,97	3,22	324	385	56
	BR	1064	4257	3,96	3,18	320	388	55
	BNR	1331	4483	3,96	3,18	326	401	54
GALAŢI	Cattle	2055	4733	3,75	3,23	305	397	73
	B	2	3543	3,39	3,14	321	457	96
	BR	7	2833	3,31	3,33	264	444	94
	BNR	2046	4740	3,75	3,23	305	397	73
IAŞI	Cattle	3596	4335	3,84	3,26	336	410	68
	B	97	4572	3,95	3,26	356	465	82
	BR	24	5320	3,94	3,33	331	410	76
	BNR	3475	4322	3,93	3,26	335	408	68
SUCEAVA	Cattle	553	4161	3,89	3,20	308	389	61
	B	169	3701	3,87	3,21	308	389	60
	BR	175	3845	3,92	3,18	312	413	64
	PT	145	4118	3,86	3,23	303	347	59
	BNR	64	6332	3,89	3,18	313	394	60
VASLUI	Cattle	2106	5755	3,83	3,28	367	416	53
	B	47	5211	3,67	3,25	351	449	47
	BR	28	5519	3,75	3,23	371	491	58
	PT	2	4724	3,48	3,23	338	368	35
	BNR	2029	5771	3,84	3,28	368	414	53

Among the reproductive indicators analyzed, breast rest (R.M.) had optimal values for all breeds and in all studied counties, between 35 and 96 days. Regarding the age of the first calving, the Bălțată cu Negru Românească breed (BNR) had values between 28.29 - 32.27 days, the Bălțată Românească breed (BR) between 29.19 - 33.26 days and the Brună breed (B.) with values between 28.28 - 37.40 days [4,10,20].

The lowest values for calving interval are the Romanian Bălțată breed (B.R.), being a mixed breed, with a robust constitution, it behaves much better in terms of reproduction activity [4,10,21] [Maciuc, 2012; Roy, 1980].

In figure 1 we present the hierarchy of the studied breeds, according to the milk production and total effective:

Data from I.N.S. (National Institute of Statistics) highlights that meat production has reached the level of 206 thousand tons live weight at slaughter in 2016, 6 thousand tons more than in 2015 when meat production was 200 thousand tons live weight at slaughter. Compared to 2013, we see a decrease in beef production, which may be due to market fluctuations that occur both nationally and in the Community market.

Regarding the slaughter of cattle in the specialized units, the number of slaughtered heads decreased, but the average weight in the carcass increased.

Following Romania's integration into the EU, the beef production sector had to align with specific European regulations aimed at the production, processing and marketing of this important food product. Also, this activity has to face fierce competition from both European and continental producers (especially from South America, North America and Australia).

Therefore, the results obtained in the cross-border area of Romania show that only by respecting all the rules related to animal welfare, starting with food, care, maintenance, health and the use of environmentally friendly technologies, sustainable productions can be obtained and ensure profitability explosions.

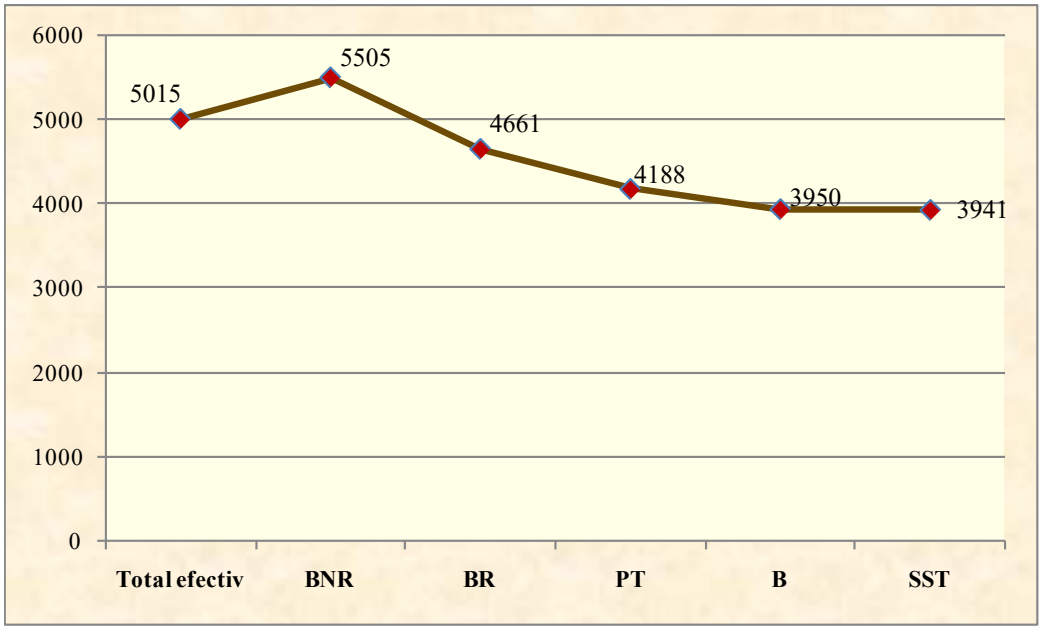

Figure 1. **Studied breeds hierarchy by milk production and number of individuals**

The cross-border study in the Odessa region, Ukraine showed that cattle breeding activity plays an important role in the agricultural context of the area [4,22]. The breeding of dairy cows in the Odessa region is represented by the breeds of the Ukrainian Red Milk, the Ukrainian Black Spotted and the Steppe Red. For the period 2013 - 2014 in all types of farms the total number of cattle decreased by 2058 animals or 6.11%, and the number of cows decreased by 956 or 7.18% (Table 2).

Raw milk production was influenced by the total number of animals and their productivity, increasing by 4 thousand tons. The average annual production per cow was 3.577 kg in 2014, less by 262.0 kg compared to 2013. On average, in 2013-2014, 35.23 - 32.20 thousand tons of milk were produced.

The analysis of the productivity of the animals from the farms highlights the fact that the average milk production on the three lactations was: Ukrainian red breed – 4.215 kg, Ukrainian black spotted – 4.665 kg, Steppe red – 3.394 kg milk.

The milk production in farms from Odessa region, by breeds and lactation is shown in Table 3.

Table 2 – **Cattle herd, and milk and meat production in Odessa area**

Years	Herd at 1st of January		Milk (thousand of tones)	Meat (thousand of tones)	Average milk production/ cattle (kg)
	Total	Total of females			
2013	33725	13320	397,9	35,23	3839
2014	31667	12364	401,9	32,20	3577

Table 3 – **Milk production in farms from Odessa area**

Breed	Cattle number	Milk production per lactation, kg			
		Lactation I	2nd Lactation	3rd Lactation	Average lactation
Ukrainian red	2354	3815	4205	4627	4215
Bălțată cu Negru Românească (BNR)	1875	4325	4.734	4938	4665
Red steppe	850	3215	3.420	3548	3394

As for beef cattle in the Odessa region, they are mainly Aberdeen Angus breed. In January 2014, the number of beef cattle was 2993 thousand heads, of which cows – 1.115 thousand heads. The total number of beef cattle decreased by 403 heads or 11.9% compared to 2013, and in cows, decreased by 224 heads or 16.7%.

Table 4 shows the live beef production and the average daily increase in the conditions of the Odessa region.

Meat production in 2014 was 32.203 kg, and in 2013 – 35.233 kg, by 3.030 kg less or 8.6%.

The average daily increase in 2014 in the districts of the Odessa area was 402 g per day, 23 g more than in 2013.

ultimately determines the level and quality of production.

Therefore, five fundamental freedoms must be ensured: freedom from discomfort - animals must have an adequate living environment, which includes a shelter and a comfortable resting area; freedom to express the natural behavior - animals must be given sufficient space and the company of animals of the same species; freedom from hunger and thirst - animals must have unlimited access to fresh water and adequate food to maintain their health; lack of fear and stress - animals must be treated in a way that does not cause them mental distress; lack of pain and disease - animals need to be diagnosed quickly and treated appropriately.

Table 4 – **Meat production in live animal and daily weight gain**

Odessa area	2014	2013	2014 compared to 2013%
Cattle meat production, Kg	32203	35233	91.4
Daily weight gain, by area, per day in grams	402	379	

The meat and dairy sector in the area is represented by a number of 67 companies that process most of the production.

There is a breeding network in the region, which provides biological material and specialized assistance to farmers and households. To maintain animal healthy, there are 491 veterinary centers and a network of veterinary pharmacies that serve the needs of farmers and private breeders. In addition, there are 89 places in veterinary education at the National Faculty of Veterinary Medicine.

These results can be seen as modest, so the cattle breeding in this area of Ukraine is a priority.

In the cross-border area of the two countries, the cattle breeding on farms of various sizes is different from one area to another and sometimes within the same area in terms of the existence of fodder areas (especially pastures); also the opportunities to provide fodder resources, labor, the degree of technical-material endowment, with machinery and mechanization installations, of the biological material used in exploitation (cow breed), and last but not least of the way of capitalization of the production or even of the existing traditions are different.

Also, in the cross-border area of Romania and of Ukraine, in the analyzed farms, with large or family-type farms, the allocation of production factors is under necessity, the current conditions, especially financial, allowing only the use of some factors of production (breed, feed). If in Romania the European financing has contributed to the improvement of the performances, in Ukraine, the farmers face big deficiencies.

All EU countries it must ensure welfare conditions in the exploitation of bovine animals, which

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Conclusions.

1. In all the cross-border studied counties of Romania, the average milk production per lactation and by breeds varied as follows: Transylvanian Pinzgau breed (PT) – 4.118–4.724 Kg milk, Brună breed (B.) – 3.543–5.211 Kg milk, Bălțată Românească breed (BR) – 2.833–5.519 Kg milk, and Bălțată cu Negru Românească (BNR) – 4.322–6.332 Kg milk.

2. The average milk production per cow in the Odessa area was 3.577 kg in 2014, lower by 262.0 kg compared to 2013, and regarding the breed it was as follows: Ukrainian red milk – by 4.215 kg, Black spotted Ukrainian by 4.665 kg, and Red Steppe by 3.394 kg milk.

3. The meat production in Romania is 206 thousand tons live weight at slaughter in 2016, with 6 thousand tons more than in 2015, when the meat production was 200 thousand tons live weight at slaughter. As for the cattle slaughter in specialized units, the number of slaughtered heads decreased, but the average weight in the carcass increased (from 280 Kg to 327 Kg).

4. For the Odessa area, meat production in 2014 was 32.203 kg, and in 2013 35.233 kg with 3.030 kg less or 8.6%. The average daily increase was 402 g per day in 2014, 23 g more than in 2013.

5. We find that both in the cross-border area of Romania and of Ukraine, in the analyzed farms, with large or family-type farms, the allocation of production factors is below needs, the current conditions, especially financial, allowing

only the use only of some factors of production (breed, feed). If in Romania, European funding contributes to achieving the sustainability of cattle production, in Ukraine, farmers face major deficiencies.

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Порівняльне оцінювання стійкості продукції худоби у Північно-Східному прикордонному регіоні Румунії

Василь Мачюк, Клавдія Пинзару, Резван Михайло Раду-Русу, Віта Бількевич.

Досліджено виробництво продукції великої рогатої худоби у транскордонному регіоні Північно-Східної Румунії та Одеській області України. Встановлено, що середня молочна продуктивність у період лактації та за породами у Румунії варіювалася наступним чином: трансильванська порода пінцгау (PT) – 4118–4724 кг молока, порода бруна (B.) – 3543 – 5211 кг молока, бальцатська романська порода (BR) – 28 5519 кг молока, а Bălată cu Negru Românească породи (BNR) – 4,322–6,332 кг молока. Виробництво м'яса у 2016 році становило 206 тис. т живої маси на забій, що на 6 тис. т більше порівняно з 2015 роком, коли виробництво м'яса становило 200 тис. т живої маси на забій.

Середній надій на одну корову в Одеській області у 2014 році становив 3,577 кг, що на 262,0 кг менше, ніж у 2013 році, а за породами він був таким: червона українська – 4,215 кг, українська чорно-ряба – 4,665 кг та червона степова – 3,394 кг молока. Виробництво м'яса у 2014 році становило 32,203 кг, а у 2013 – 35,233 кг, що на 3,030 кг менше, або 8,6 %. У прикордонній зоні Румунії, а також у прикордонній зоні України в аналізованих господарствах з великими чи сімейними господарствами облік виробничих чинників є обов'язковим, поточні умови, особливо фінансові, дають змогу використовувати лише певні виробничі чинники (породи, корми). Якщо у Румунії європейське фінансування сприяє досягненню стійкості виробництва великої рогатої худоби, то в Україні фермери мають серйозні недоліки.

Ключові слова: велика рогата худоба, виробництво, молоко, м'ясо, стійкість, транскордонне.