

TREATMENT OF GENETIC POTENTIAL FOR PRODUCTION OF THE MEAT OF RANGE HYBRIDS OF THE PIGS ON THE FARM OF THE AGRICULTURAL COOPERATIVE EDINSTVO IN THE VILLAGE CHELOPEK IN THE MUNICIPALITY OF TETOVO, REPUBLIC OF MACEDONIA

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ABSTRACT

In industrial pig breeding, when raising pigs for fattening for the production of meat from racial hybrids of pigs, the most common pattern used for crossing are triangular hybrids of pigs. (during which the breeding process involves three races Jokshir x Landry = F1 - JL ♀ x Durak - D or Pietren - ♂). The obtained selection criteria from the mother are different from those of the father-terminal. Here the mother's hysteresis is maximally expressed, and a high selective differential is achieved on the father side. They are characterized by numerous offspring, mothers have quite a lot of milk, and the offspring in the item is equal.

The purpose of the research is to determine how the genetic potential for meat production is fulfilled in the triage pig hybrid, reared for fattening (Yoxhir x Landrand = F1-YLGuyDurak-D), compared to the achieved productive genetic potential of meat in this hybrid, obtained by application of intensive technology on the farm of the Agricultural Cooperative Edinstvo in the village Chelopek in the municipality of Tetovo, Republic of Macedonia, in the production years 2016 and 2017. The research was conducted on a representative sample of 50 heads.

From the obtained results in the production year 2016, it is concluded that the genetic potential is 112.2 kg, while the achieved genetic potential for the tested sample is 97.51 kg. The deviation from the genetic potential for meat production is 13.69 kg with the variation coefficient (VC%) of 12.31%. While for the production year 2017, it is concluded that the genetic potential is 113.96 kg, while the achieved genetic potential for the tested sample is 100.95 kg. The deviation from the genetic potential for meat production is 13.01 kg or the variation coefficient (VC%) is 11.42%. This means that if we compare the results obtained in the two years of the study, this year we can conclude that there is a genetic improvement in the weight of the pigs in the examined sample.

The obtained average results for the two production years 2016/2017 show that the genetic potential is 112.58 kg, while the achieved genetic potential for the tested sample is 99.23 kg. The deviation from the genetic potential for meat production is 13.35 kg or the variation coefficient (VC%) is 11.86%.

From the obtained results we can conclude that the retention from the genetic potential for meat production in this pig hybrid is relatively, because the production is organized in conditions of intensive cultivation technology.

Key words: pigs, hybrids, genetic potential, meat

INTRODUCTION

Meat is a product of life significance, because it has always been the most important food. The biological meaning of the meat used in human nutrition consists of the following: the proteins in their structure are similar to human beings and they are almost completely used (95%), in their proteins, there are also essential amino acids, which are necessary for the human organism. The human organism can not synthesize them and so they have to be entered in the original form (lysine, cystine, methionine, leucine). These components are easily digestible, stimulate the secretion of juices, and have a culinary value (*Radetić, Matekalo-Sverak, 2010*). The chemical composition of the meat consists of organic and inorganic parts. The organic component consists of proteins, carbohydrates and fats, and inorganic are mainly water. Protein, constitute the most important biological ingredient of meat average meat contains 20% protein. Depending on where they are located, they are called sarcoplasmins, myofibrillar and protein in the nucleus. Fats are of varying amounts depending on the type, age, diet and other. The ideal relationship between muscle and fat tissue would be 2:1. While usually depending on the breed in the cattle it ranges from 2-20%, and in pigs up to 40%. Meat containing more fat would be more caloric, however, such meat is considered to be of poor quality. Water in the meat has about 70 to 80% and is depending on the amount of fat. The meat that has more fat reduces the amount of water and vice versa. Of the other ingredients present in the meat, mention should be made of mineral substances (calcium, potassium, magnesium, sodium). Also in the meat there are vitamins-mainly from the B group (*Ivanovic, Todorovic, Batic, 2012*). The industrial production of meat in pig breeding uses racial hybrids, which are obtained by crossing two, three or four breeds of pigs, and are practiced to improve the quality of the meat. There are courtier hybrids, for example: (Jokshir h Landras) - two races, three hybrids (Jokshir h Landras = F1-JL and Durak -D), take part in three races, four-fold hybrids (Jokshir h Landras = F1-JL h Durak or four-axis hybrids (Jokkir h Landras = F1-JL) h (Durak h Pietren = F1-DP) - in which four races participate. Triple hybrids are the most common breeding scheme for breeding fattening pigs, where the mother side example: J, L have some selection criteria that differ from the paternal-terminal (D or P). Here the mother's hysteresis is maximally expressed, and a high selective differential is achieved on the father side. They are characterized by numerous offspring, mothers have quite a lot of milk, and the offspring in the item is equal. In quadruple hybrids, two parents F1 x F1 participate in the cruise, and the end product is the mutton. Such a program is applied by some companies at risk, while the offspring are not countless in number and are in disagreement in quality. This pattern of cruising is expensive and should be applied, for example if there are problems on the part of male parents for some reason (*Vidović, Visnjić, Punoš, Vukovic, 2011*). When slaughtering pigs and meat processing, the significance of veterinary sanitary control is significant for the pre-mortal examination of the animals for slaughter as well as the significance of the post-mortem inspection of the meat and organs of slaughtered animals. These procedures protect human health, especially from zoonoses, among which the most significant is trichinosis (*Krstic, 2009*). In the Republic of Macedonia, in 2017, a total of 22,879 tons of all kinds of meat was produced, of which the first place in the production is pork with 13 105 tons or 57.28%, second place is 4 636 tons of beef or 20.26% the third place is the sheep meat with 3 422 tons or 14.96%, and the fourth place is poultry with 1 716 tons or 7.50% (*State Statistical Office of the Republic of Macedonia, 2017*).

MATERIAL AND METHODS

The study provided a comparative analysis of the results obtained on a representative sample of 50 flocks of pigs of the triple hybrid (J x L = F1-YL ♀ x D) in order to determine how the genetic potential for meat production is fulfilled, which is used in the industrial production of meat in pig breeding, which are grown on the farm of the Agricultural Cooperative Edinstvo in the village Chelopek in the municipality of Tetovo, Republic of Macedonia. The research was carried out in the 2016 and 2017 production years. For statistical data processing we used the variation coefficient (VC%) in the selected sample. We presented the results tabular and graphic.

RESULTS AND DISCUSSION

Table 1. Results for the fulfillment of the genetic potential of meat production in breeding pigs for fattening, triple hybrid (J x L) x D, on the farm of the Agricultural Cooperative Edinstvo in the village Chelopek in the municipality of Tetovo, Republic of Macedonia, average production 2016 (a representative sample of 50 heads).

Number of pigs	The genetic potential of the weight / kg of breeding racial hybrids melts in 160 days (J h L = F1-JL ♀ h D)	Achieved production genetic potential weight / kg of racial hybrids for 160 days (J x L = F1-L ♀ x D) -2016	Deviation from the genetic potential	
			KG	VC%
1.	111.2	99.15	12.05	10.84
2.	111.2	111.20	/	/
3.	111.2	97.20	14.00	12.59
4.	111.2	102.00	9.20	8.27
5.	111.2	101.72	9.48	8.52
6.	111.2	99.90	11.30	10.16
7.	111.2	78.50	32.70	29.41
8.	111.2	103.15	8.05	7.24
9.	111.2	99.60	11.60	10.43
10.	111.2	98.30	12.90	11.60
11.	111.2	99.00	12.20	10.97
12.	111.2	74.70	36.50	32.82
13.	111.2	82.90	28.30	25.45
14.	111.2	109.20	2.00	1.80
15.	111.2	90.00	21.20	19.06
16.	111.2	97.80	13.40	12.05
17.	111.2	99.05	12.15	10.93
18.	111.2	103.40	7.80	7.01
19.	111.2	97.90	13,30	11.96
20.	111.2	98.00	13.20	11.87
21.	111.2	99.60	11.60	10.43
22.	111.2	96.50	14.70	13.22
23.	111.2	98.25	12.95	11.64
24.	111.2	101.10	10.10	9.08

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25.	111.2	98.80	12.40	11.15
26.	111.2	95.40	15.80	14.21
27.	111.2	100.80	10.40	9.35
28.	111.2	99.40	11.80	10.61
29.	111.2	98.74	12.46	11.20
30.	111.2	97.64	13.56	12.19
31.	111.2	102.70	8.50	7.64
32.	111.2	100.40	10.80	9.71
33.	111.2	96.50	14.70	13.22
34.	111.2	97.15	14.05	12.63
35.	111.2	89.90	21.30	19.15
36.	111.2	98.40	12.80	11.51
37.	111.2	99.80	11.40	10.25
38.	111.2	88.90	22.30	20.05
39.	111.2	102.00	9.20	8.27
40.	111.2	98.80	12.40	11.15
41.	111.2	97.50	13.70	12.32
42.	111.2	98.74	12.46	11.20
43.	111.2	99.40	11.80	10.61
44.	111.2	100.50	10.70	9.62
45.	111.2	96.30	14.90	13.40
46.	111.2	98.50	12.70	11.42
47.	111.2	99.90	11.30	10.16
48.	111.2	95.30	15.90	14.30
49.	111.2	92.04	19.16	17.23
50.	111.2	93.80	17.40	15.65
Average	111.2	97.51	13.69	12.31

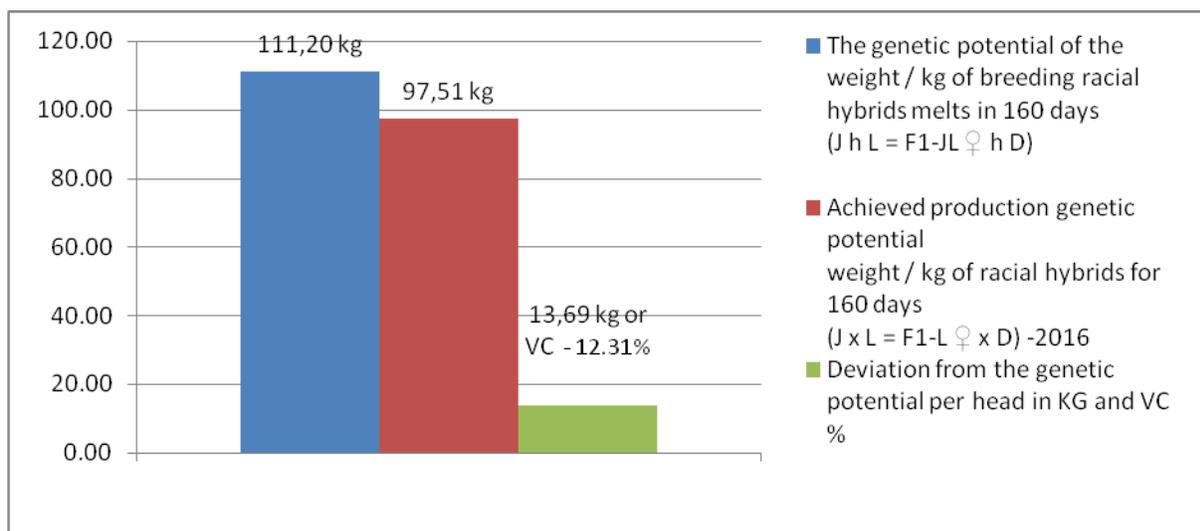


Chart 1. The results were obtained for the fulfillment of the genetic potential of meat production when raising pigs for fattening, racial hybrid moles (J x L = F1-YL ♀ x D), on the farm of the Agricultural Cooperative Edinstvo in the village Chelopek in the municipality of Tetovo, Republic of Macedonia, average production 2016 (a representative sample of 50 heads).

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From the results obtained for the fulfillment of the genetic potential for meat production in Table 1 and Graph 1, in the production year 2016, when raising pigs for fattening, racial hybrids (J x L = F1-YL ♀ x D), on the farm of the Agricultural Cooperative Edinstvo in the village Chelopek in the municipality of Tetovo, Republic of Macedonia, (a representative sample of 50 heads) concluded that it was 112.2 kg, while the achieved genetic potential for the sample tested was 97.51 kg. The deviation from the genetic potential for meat production is 13.69 kg or the variation coefficient (VC%) is 12.31%.

Table 2. Results obtained for fulfilling the genetic potential of meat production during breeding of pigs for fattening, racial hybrid moles (J x L = F1-YL ♀ x D), on the farm of the Agricultural Cooperative Edinstvo in the village Chelopek in the municipality of Tetovo, Republic of Macedonia, an average for production 2017 (a representative sample of 50 heads).

Number of pigs	The genetic potential of the weight / kg of breeding racial hybrids melts in 160 days (J h L = F1-JL ♀ h D)	Achieved production genetic potential weight / kg of racial hybrids for 160 days (J x L = F1-L ♀ x D) -2017	Deviation from the genetic potential	
			KG	VC%
1.	113.96	100.00	13.96	12.25
2.	113.96	103.72	10.24	8.98
3.	113.96	111.96	2.00	1.75
4.	113.96	102.00	11.96	10.49
5.	113.96	103.24	10.72	9.41
6.	113.96	104.66	9.30	8.16
7.	113.96	83.26	30.70	26.94
8.	113.96	103.91	10.05	8.82
9.	113.96	103.42	10.54	9.25
10.	113.96	100.00	13.96	12.25
11.	113.96	98.76	15.20	13.34
12.	113.96	100.46	13.50	11.85
13.	113.96	90.66	23.30	20.44
14.	113.96	106.96	7.00	6.14
15.	113.96	94.72	19.24	16.88
16.	113.96	98.56	15.40	13.51
17.	113.96	113.96	/	/
18.	113.96	108.00	5.96	5.23
19.	113.96	102.78	11.18	9.81
20.	113.96	99.00	14.96	13.13
21.	113.96	104.16	9.80	8.60
22.	113.96	98.00	15.96	14.00
23.	113.96	102.27	11.69	10.26
24.	113.96	101.86	12.10	10.62
25.	113.96	103.56	10.40	9.13
26.	113.96	101.16	12.80	11.23
27.	113.96	100.56	13.40	11.76
28.	113.96	100.16	13.80	12.11
29.	113.96	103.50	10.46	9.18
30.	113.96	102.86	11.10	9.74
31.	113.96	103.00	10.96	9.62

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32.	113.96	100.16	13.80	12.11
33.	113.96	101.26	12.70	11.14
34.	113.96	97.91	16.05	14.08
35.	113.96	95.66	18.30	16.06
36.	113.96	100.00	13.96	12.25
37.	113.96	103.72	10.24	8.98
38.	113.96	95.66	18.30	16.06
39.	113.96	100.76	13.20	11.58
40.	113.96	99.56	14.40	12.64
41.	113.96	102.26	11.70	10.27
42.	113.96	103.50	10.46	9.18
43.	113.96	100.16	13.80	12.11
44.	113.96	100.26	13.70	12.02
45.	113.96	102.00	11.96	10.49
46.	113.96	102.32	11.64	10.21
47.	113.96	101.66	12.30	10.79
48.	113.96	96.56	17.40	15.27
49.	113.96	97.86	16.10	14.13
50.	113.96	95.00	18.96	16.64
Average	113.96	100.95	13.01	11.42

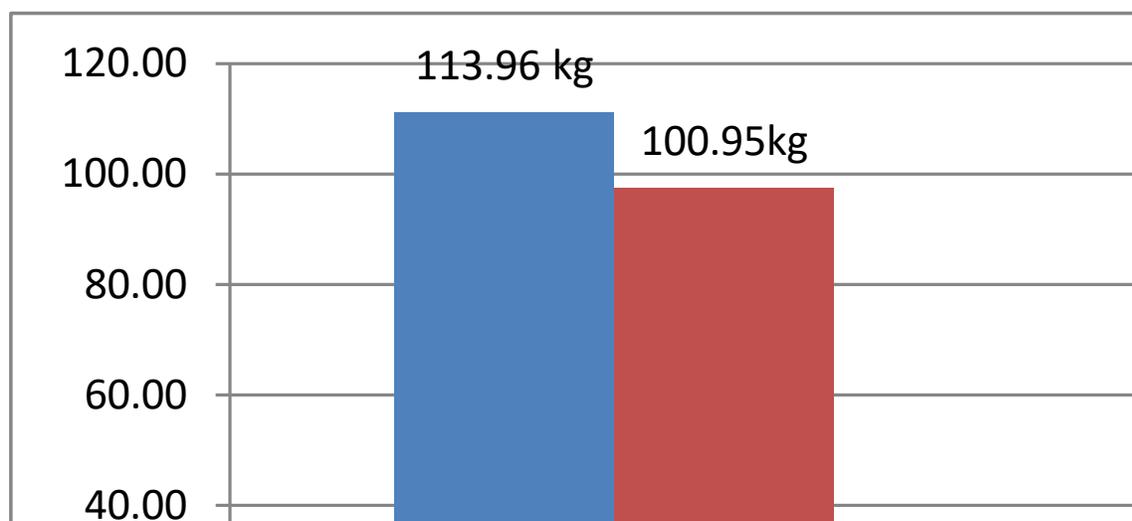


Chart 2. Obtained results for fulfilling the genetic potential of meat production during breeding of pigs for fattening, racial hybrid moles ($J \times L = F1-YL \text{♀} \times D \text{♂}$), on the farm of the Agricultural Cooperative Edinstvo in the village Chelopek in the municipality of Tetovo, Republic of Macedonia, in the production year 2017.

From the results obtained to meet the genetic potential for meat production in Table 1 and Graph 1, in the production year 2017, when breeding pigs for fattening a three-sided hybrid ($J \times L = F1-YL \text{♀} \times D$), on the farm of the Agricultural Cooperative Edinstvo in the village Chelopek in the municipality of Tetovo, Republic of Macedonia (a representative sample of 50 heads) concluded that it amounted to 113.96 kg, while the achieved genetic potential for the tested sample was 100.95 kg. The deviation from the genetic potential for meat production is 13.01 kg or the variation coefficient (VC%) is 11.42%.

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Table 3. Obtained results for fulfilling the genetic potential of meat production in breeding pigs for fattening of a triple hybrid (J x L = F1-YL ♀ x D), on the farm of the Agricultural Cooperative Edinstvo in the village Chelopek in the municipality of Tetovo, Republic of Macedonia, average for production 2016/20017 (a representative sample of 50 heads).

Number of pigs	The genetic potential of the weight / kg of breeding racial hybrids melts in 160 days (J h L = F1-JL ♀ h D)	Achieved production genetic potential weight / kg of racial hybrids for 160 days (J x L = F1-L ♀ x D) - 2016/2017	Deviation from the genetic potential	
			KG	VC%
		Average 2016 – 2017	2016-2017	2016-2017
1.	112.58	99.57	13.01	11.56
2.	112.58	101.38	11.20	9.95
3.	112.58	104.58	8.00	7.11
4.	112.58	102.00	10.58	9.40
5.	112.58	102.48	10.10	8.97
6.	112.58	102.28	10.30	9.15
7.	112.85	80.88	31.70	28.16
8.	112.58	103.53	9.05	8.04
9.	112.58	101.51	11.07	9.83
10.	112.58	99.15	13.43	11.93
11.	112.58	98.88	13.70	12.17
12.	112.58	87.58	25.00	22.21
13.	112.58	86.78	25.80	22.91
14.	112.58	108.08	4.50	4.00
15.	112.58	92.36	20.22	17.96
16.	112.85	98.18	14.40	12.79
17.	112.58	112.58	/	/
18.	112.58	105.70	6.88	6.11
19.	112.58	100.34	12.24	10.87
20.	112.58	98.50	14.08	12.51
21.	112.58	101.88	10.70	9.50
22.	112.58	97.25	15.33	13.62
23.	112.58	100.26	12.32	10.94
24.	112.58	101.48	11.10	9.86
25.	112.85	101.18	11.40	10.13
26.	112.58	98.28	14.30	12.70
27.	112.58	100.68	11.90	10.57
28.	112.58	99.78	12.80	11.37
29.	112.58	101.12	11.46	10.18
30.	112.58	100.25	12.33	10.95
31.	112.58	102.85	9.73	8.64
32.	112.58	100.28	12.30	10.92
33.	112.58	98.88	13.70	12.17
34.	112.85	97.53	15.05	13.37
35.	112.58	92.78	19.80	17.59
36.	112.58	99.20	13.38	11.88
37.	112.58	101.76	10.82	9.61

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38.	112.58	92.28	20.30	18.32
39.	112.58	101.38	11.20	9.95
40.	112.58	99.18	13.40	11.90
41.	112.58	99.88	12.70	11.28
42.	112.58	101.12	11.46	10.18
43.	112.58	99.78	12.80	11.37
44.	112.85	100.38	12.20	10.84
45.	112.58	99.15	13.43	11.93
46.	112.58	100.41	12.17	10.81
47.	112.58	100.78	11.80	10.48
48.	112.58	95.93	16.65	14.79
49.	112.58	94.95	17.63	15.66
50.	112.58	94.40	18.18	16.15
Average	112.58	99.23	13.35	11.86

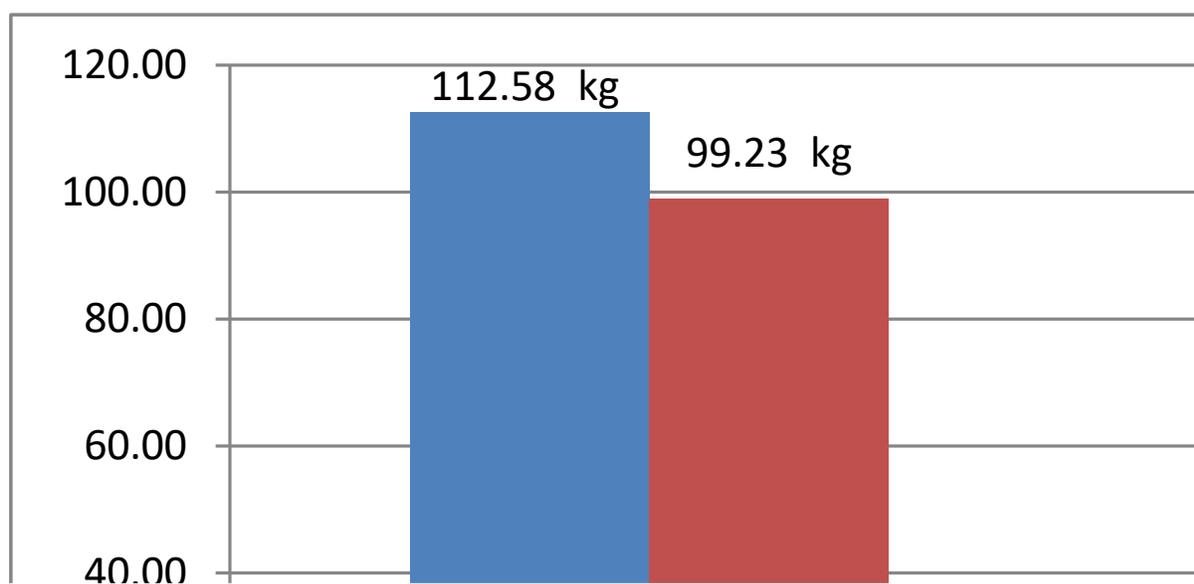


Chart 3. The results obtained for fulfilling the genetic potential of meat production in breeding pig breeds, on a triple hybrid (J x L = F1-YL ♀ x D), on the farm of the Agricultural Cooperative Edinstvo in the village Chelopek in the municipality of Tetovo, Republic of Macedonia, average for production 2016/20017 (a representative sample of 50 heads).

From the obtained average results for meeting the genetic potential for meat production in Table 3 and Graph 3, in the 2016/2017 production, when digging pigs for fattening a triple hybrid (J x L = F1-YL ♀ x D) on the farm of the Agricultural Cooperative Edinstvo in the village Chelopek in the municipality of Tetovo (a representative sample of 50 heads) was selected based on the use of similar technology for accommodation, auxiliary technological equipment and tools, microclimatic conditions, selection and improvement of the quality of the obtained offspring and diet, which are to it turns out that for the two years it has an average of 112.58 kg, while the achieved production genetic potential for the examined sample is 99.35 kg. The average deviation from the genetic potential for meat production is 13.35 kg or the variation coefficient (VC%) is 11.86%.

Similar results were obtained in the surveys conducted by the MZSV of the Republic of Macedonia, published in the "Strategy for the improvement and monitoring of the quality of meat 2013-2020 [5], the part of the population of pigs that is covered in the research, that is, it is under the control of production and reproductive properties, it was also found that the number of swine was reduced, and the increase in meat production, probably as a result of the use in pig production of pig meat in piglets of three-pig hybrids for production of meat with higher genetic potential. The basic strategic goal of the pig industry in the Republic of Macedonia in the following period is satisfying the domestic market with pork meat and improving the percentage of domestic meat needs from domestic production.

CONCLUSIONS

In the Republic of Macedonia, the largest number of pig farms are small farms in the individual sector as family farms, while the number of large farms for industrial production of pork is very small and it functions as business entities.

From the conducted research on the fulfillment of the genetic potential in pig fattening for treating a triple hybrid ($J \times L = F1-YL \text{ ♀} \times D \text{ ♂}$), on the farm of the Agricultural Cooperative Edinstvo in the village Chelopek in the municipality of Tetovo (a representative sample of 50 heads), selected based on the use of similar technology for accommodation, auxiliary technological equipment and tools, microclimatic conditions, selection and improvement of the quality of the obtained offspring and nutrition, from the obtained results, the following conclusions can be drawn:

From the results achieved in the production year 2016, during the breeding of pigs for fattening a three-sided hybrid ($J \times L = F1-L \text{ ♀} \times D$), it can be concluded that it is 112.2 kg, while the achieved production genetic potential is average for the investigated sample is 97.51 kg. The deviation from the genetic potential for meat production is 13.69 kg or the variation coefficient (VC%) is 12.31%. From the results achieved in the production in 2017, in the breeding of pigs for fattening the triple hybrid ($J \times L = F1-YL \text{ ♀} \times D \text{ ♂}$), it can be concluded that it is 113.96 kg, while the achieved production genetic potential average for the sample tested is 100.87 kg. The deviation from the genetic potential for meat production is 13.09 kg or the variation coefficient (VC%) is 11.49%. From the achieved average results in the production 2016/2017, when breeding pigs for fattening the triple hybrid ($J \times L = F1-LL \text{ ♀} \times D \text{ ♂}$), it is concluded that for the two years it has an average of 112.58 kg, while the achieved production the genetic potential on average for the examined sample is 99.19 kg. The average deviation from the genetic potential for meat production is 13.39 kg or the variation coefficient (VC%) is 11.90%.

According to the results obtained in the two years of research, using intensive breeding technology, recommended by the producer of racial hybrids of pigs for meat production, we can conclude that the triple hybrid ($J \times L = F1-LL \text{ ♀} \times D$), fulfills the genetic potential for meat production with 88.14%, on the farm of the Agricultural Cooperative Edinstvo in the village Chelopek in the municipality of Tetovo, which means that it is a highly commercially profitable hybrid for meat production.

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