



## INFLUENCE OF NUTRITIOUS DIETS ON COMPENSATORY GROWTH AND MEAT PRODUCTIVITY OF STEERS

Khidirov K.I.

Ph. Research Institute of Animal Husbandry and Poultry Husbandry  
Republic of Uzbekistan

<https://doi.org/10.5281/zenodo.6303303>

### ARTICLE INFO

Received: 15<sup>th</sup> February 2022

Accepted: 20<sup>th</sup> February 2022

Online: 25<sup>th</sup> February 2022

### KEY WORDS

*Simmental breed, growing, compensation, feeding, the weight, meat productivity, growing of the muscles.*

### ABSTRACT

*The ways of intensive rearing influence on the meat productivity of the stunted young cattle of Simmental breed and the ways of rational using of genetic possibilities of the animals of the studied groups for increasing the production of high-quality beef and increasing the profitability of the branch have been revealed. The experimental data replenish the scientific information and substantiate the comprehensive research on improving the Simmental breed and give practical recommendations for organizing the rearing of young animals, taking into account the weight and age specificity. The determined biological laws of growth and development of the tissues supplement and expand the views on the quantitative and qualitative estimation of the meat productivity of young animals.*

**Introduction.** The actual problem of cattle breeding is to increase beef production. In this regard, it is necessary to use biological possibilities of animals more rationally. That is why there is a necessity to periodically research productive qualities of cattle of various breeds, because they are subject to changes under the influence of various factors (I.P. Zadnepryansky, 1992; V.I. Kosilov, 1995; V.I. Gudymenko, 1996; A.A. Salikhov et al, 1997, F.G. Kayumov, 1999).

Currently, quite a lot of data on the study of genetic parameters determining the meat productivity of Simmentals has been accumulated. At the same time, the materials obtained are contradictory, which is due to the nature of the trait,

population size, intensity of selection, rearing conditions and do not fully reflect the formation of meatiness of young animals (A.B. Panina, 1973; L.P. Prakhov, 1975; S.S. Gutkin et al., 1979; 1999; A.B. Cherekaev, 1990; L.K. Ernst, 1992; D.L. Levantin, 1996).

In addition, the breed has undergone significant changes in recent years - highly productive lines and types of animals have been created. Therefore, at the present time the complex evaluation of meat productivity of Simmentals and the study of peculiarities of formation of meatiness of young animals of different weight and physiological state have a great importance.



Knowledge of the peculiarities of the formation of meat productivity of young animals of different sex and age groups will allow to develop a program to control the development of the organism in one or another stage of ontogenesis and give an opportunity not only to increase the productivity of animals, but also to improve the nutritional value of beef.

The purpose of the present study is to study meat productivity, meat quality and the degree of compensatory ability of steers retarded in growth and development in the intensive technology of growing for meat.

Material and methodology of the research. The scientific-economic experience was conducted in Uzbek-British JV LLC "INZIM-TEX" of Syrdarya district of Syrdarya region in 2018-2020. At that the research was conducted on three groups of Simmental steers, 11 heads in each group, from 7 to 18 -months age. Group I (control) formed of steers with an average live weight of 203 kg, II- experimental group - steers with a live weight of 170 kg, and III group - steers with a live weight of 150 kg.

Steers are fed according to the norms set by Kalashnikov A.P. (M, 2003), taking into consideration the live weight and fodder conditions of the farm. Steers of experimental group II were fed by 10-15% more nutritious ration, of experimental group III - by 20-25% than the control group, using vitamin and mineral supplements in all groups.

The method of keeping steers was as follows: up to 15 months of age - in buildings with feeding yards, and fattening from 16 to 18 months of age was conducted in the fattening area under shady sheds.

**Research results.** During the whole period of the experiment the animals were fed with their own feed (except mixed fodder) and the same type of feeding was used. Due to unequal eating ability, differences in feed and nutrient intake were established. The bulls of group II with 10-15% more nutritious diets were inferior to their peers of group III (20-25% more nutritious diets) in terms of feed units consumption by 5.3%, metabolizable energy by 1338.8 MJ and digestible protein by 17.6 kg. At the same time, Group II steers outperformed Group I peers by 9.0% in consumption of fodder units, 2516.9 MJ of metabolizable energy and 25.9 kg of digestible protein. and Group III steers respectively by 13.8%; 3855.6 MJ; 43.5 kg. The specific weight of concentrated fodder during the whole period of rearing was 37.8%, 37.0%, 37.3% by groups.

In all groups, the concentration of energy in 1 kg of fodder units was 10.5 MJ, and the content of fodder units in 1 kg of dry matter was 0.88 in group I, 0.84 in group II and 0.86 in group III.

The created conditions of complete feeding of animals during the experiment were, in our opinion, of great importance not only as a factor of providing the energy requirements of the organism, but also as a factor of influence on their productivity.

Thus, the conditions created for intensive rearing of experimental steers to realize the genetic potential of meat productivity were satisfactory. At the same time, animals of different groups reacted differently to them, which influenced the intensity of growth and meat productivity indicators.

Analysis of the data obtained on the weight growth of test steers from 7 to 18



months showed that there were certain differences in the nature of growth (Table 2). As can be seen from the table, bulls of group I (control) surpassed the bulls of group II by 32.4 kg of live weight when they were put on experiment. Increasing

the nutritive value of the diet of bulls of group II by 10-15% allowed us to reduce this lag at 9 months of age to 18,6 kg, at 12 months of age to 5,7 kg, and at 15 months of age they exceeded the control group by 0,8 kg and at 18 months of age by 6,1 kg.

Table 1

Dynamics of live weight of experimental bulls, kg (X + S x)

Age, month	Groups		
	I	II	III
At standing for the experiment	203,0+7,5	170,6+8,8	150,0+7,2
9	266,6+9,9	248,0+10,4	218,7+8,4
12	340,7+9,3	335,0+10,6	297,5+9,9
15	425,7+11,1	426,5+10,9	383,5+10,5
18	517,3+11,2	523,4+11,8	473,9+9,9

Despite the 20-25% increase in the nutritive value of the diet, group III steers were inferior in live weight to steers of groups I and II at all ages. When they were bred for the experiment their live weight was 50,3 and 20,6 kg lower, at 9 months by 47,9 and 29,3 kg, at 12 months - 45 and 37,5 kg, at 15 months - 42,2 and 43 kg, at 18 months - 43,4 and 49,5 kg respectively.

In the production of beef, the absolute growth rate, expressed in average daily gain, is important. As can be seen from Table 3, the average daily gain and absolute growth rate in steers of different groups had different intensity.

With intensive feeding, it was possible to obtain a fairly high absolute and average daily gain of live weight. Group II bulls surpassed their coevals of groups I and III in terms of the indicator under study during certain age periods. At the age of 7-15 months (period of growing) they surpassed their peers of groups I and III in the absolute gain by 31,5 and 20,3 kg, and average daily gain by 115 and 74 g, respectively, and during fattening period (16-18 months) by 5,4 - 6,6 kg and 59-73 g. Therefore, bulls of group II were superior to their peers of other groups studied.

Table 2

Absolute and average daily gain of live weight of test steers, (X + S x)

Age, month	Groups					
	I		II		III	
	Absolute-Gain, kg	Average daily gain,	Absolute-Gain, kg	Average daily gain,	Absolute-Gain, kg	Average daily gain,



		g		g		g
7-9	63,3	0,703	75,4	0,837	68,7	0,763
10-12	74,1	0,823	87,0	0,966	78,8	0,876
13-15	85,0	0,944	91,5	1,016	86,0	0,956
16-18	91,5	1,016	96,9	1,076	90,4	1,004
7-18	314,3	0,861	350,8	0,961	323,9	0,887

In our studies, groups of animals were formed of the same age, i.e. 7 months, but with different live weights. Group I control bulls had a live weight of 203 kg (100%), while Group II experimental bulls had a live weight of 170.6 kg (84.0%) and Group III experimental bulls had a live weight of 150 kg (73.8%). The analysis of the diagram shows. When steers of groups II and III were put to experiment, they were 16% and 35.3% less by live weight than the control group, respectively. An increase in the nutritive value of the diet of bulls of group II by 10-15% enabled to reduce the lag during the following breeding periods and by the age of 15 months to fully liquidate the lag and to leave the control group by 1.2% (6.1 kg) at the end of the experiment. Group III steers, despite increasing the intensity of feeding by 20-25%, were unable to completely cover the lag in live weight by the end of the

experiment, but reduced it to 9.1% (43.4 kg).

To study meat productivity we made control slaughter of experimental steers 3 heads in each group at the age of 7 and 18 months (Table 3).

From the table we see that before slaughter the live weight at the age of 7 months was 192,2 kg for bulls of the first control group, 161,5 kg for bulls of the second group and 147,1 kg for bulls of the third group, (19%), Group III - 45,1 kg (30,6%) The weight of the carcass of group I bulls was 82,4 kg, group II - 67,5 kg, group III - 56,7 kg, so the weight of the carcass of group I bulls exceeded the Group II animals by 14,9 kg (24,7%) and Group III - by 25,7 kg (45,3%) percent. The weight of internal fat in the animals of the control group was 1.98 kg, in bulls of experimental groups it was 1.24-0.65 kg.

Table 3

Slaughter parameters of experimental bulls  
At 7 months of age, (X + S x)

Indexes	Groups		
	I	II	III
at the age of 7 months			
Body weight,kg	202,3±2,89	170,0±14,43	150,0±1,73
Pre-slaughter live weight,kg	192,2±2,8	161,5±14,0	147,1±1,7
Carcass weight,kg	84,2±6,6	67,5±6,12	56,68±1,62
Carcass yield,%	43,85	41,1	38,53
Weight of internal fat,kg	1,98±0, 2	1,24±0,12	0,65±0,06
Yield of internal fat,%	1,03	0,77	0,43



Slaughter weight,kg	86,27±6,7	68,69±7,1	57,33±2,82
Slaughter yield,%	44,88	42,53	38,96
at the age of 18 months			
Withdrawable living mass,kg	517,3±20,7	523,4±27,7	473,9±13,2
Pre-slaughter live weight,kg	503,8±21,8	508,1±26,8	460,7±13,0
Carcass weight,kg	274,8±13,0	275,5±14,4	245,2±6,9
Carcass yield,%	54,4	54,5	53,2
Weight of internal fat,kg	6,2±0,57	7,0±0,66	9,0±0,3
Yield of internal fat,%	1,24	1,39	1,95
Slaughter weight,kg	280,1±13,6	282,5±15,1	254,2±7,2
Slaughter yield,%	55,6	55,8	55,2

The slaughter yield was 44.8% for the control group steers and 42.5-39.0% for the experimental group steers.

An increase in the level of feeding of experimental steers by 10-25% improved the meat indicators. Group II bulls at the age of 18 months surpassed their coevals by 2.7-47.4 kg according to preslaughter weight, by 0.7-30.3 kg according to carcass weight and by 2.4-8.3 kg according to slaughter weight. The slaughter yield was 55.6% in group I, 55.8% in group II and 55.2% in group III.

The deboning of half carcasses allowed us to establish certain differences in the morphological composition of

anatomical carcass parts depending on the level of feeding (Table 4).

A higher yield of the fleshy part at 18 months of age was in bulls of group II in comparison with their counterparts in other groups. Thus, by weight of flesh they surpassed their counterparts of group I by 10,1 kg (9,9%) and group III by 13,4 kg or 14,1% (P<0,05). The relative number of bones was lower in group II - bulls - 17.0%. The highest number of bones was observed in group I - bulls - 24,1%. The relative amount of cartilage and tendons was the lowest in group II steers (1.8%), and the highest amount was in group III - 2.3%.

Table 4

Morphological composition of half carcasses of experimental steers, kg (X + S x)

Indexes	Groups					
	I		II		III	
	кг	%	кг	%	кг	%
At the age of 7 months						
Weight of half carcasses	41,3+4,6	100	31,1+3,1	100	28,2+1,44	100
incl. flesh	28,95+3,0	68,76	22,72+2,7	68,0	18,49+1,0	66,31
bones	11,43+1,3	28,92	9,65+0,65	29,73	8,8+0,44	30,65



tendon	0,94+0,18	2,36	0,73+0,09	2,25	0,92+0,01	3,04
Meatiness index	2,53		2,35		2,10	
At the age of 18 months						
Weight of half carcasses	137,24+9,7	100	137,42+12,1	100	122,44+3,7	100
incl. flesh	110,46+6,4	80,49	111,46+8,8	81,11	97,72+2,9	79,81
bones	24,36+4,23	17,75	23,46+4,8	17,07	22,38+1,1	18,28
tendon	2,42+0,21	1,76	2,50+1,1	1,82	2,34+0,44	1,91
Meatiness index	4,53		4,75		4,37	

Compared to bulls' carcasses at 18 months of age, the weight of the fleshy part of the animals increased by 3.3 times in bulls of experimental group, by 4.2 times in group II and by 4.3 times in group III. Group III bulls were noted for the increase in fleshiness and surpassed their coevals by 45,8-23,0% in comparison to the carcasses at the age of 7 months. The highest growth of bone tissue was noted in Group I - 19,63 kg, in Group II - 11,87 kg and in Group III -

8,77 kg; growth of tendons and cartilage tissue was 1,93; 1,89; 1,90 kg.

The increase in muscle mass depends on the breed, the level of feeding and housing. In this work, we studied the change in the musculature of the experimental groups under intensive feeding after the animals reached slaughtering condition. We studied the absolute and relative muscle mass in the carcasses of steers of 7 and 18 months of age (Table 5).

Table 5

Dynamics of changes in muscle growth, g

Indexes	groups					
	I		II		III	
	7 months	18 months	7 months	18 months	7 months	18 months
Chest muscles	2555	17724	1920	18240	1595	14442
Spinal column muscles	2665	17536	1780	17933	1325	15434
Muscles of thoracic extremity	3295	11652	2150	11915	1640	10292
Hip limb muscles	10970	37398	8160	38801	6609	32676
Total	19485	84309	14010	86889	11169	72843

At 7 months of age the weight of muscles under study in control steers was 20.84 kg, which was 5.5 kg (39.0%) more than in

group I and 8.3 kg (74.4%) more than in group III. Increasing the level of feeding of steers of experimental groups stimulated



an increase in the weight indices of the musculature. At 18 months of age the weight of muscles in bulls of group II (increase in feed nutrition by 10-15%) was 86,9 kg, which is 2,6 kg (3,1%) more than in group I and 14,1 kg (19,2%) more than in group III. In turn, Group III steers were 11.5 kg (15.7%) inferior to the control group.

In determining the economic efficiency, the cost of labor and funds for production was determined. The main share of costs was the cost of feed 50-65% and wages 12-18%. Wages of workers fully depends on the received weight gain. The higher the weight gain, the higher the labor costs. Due to the fact that the animals of group II gave relatively high weight gain, the cost of production was less compared to the bulls of groups I and III by 2900.0 sum (7.6%) and 3500 sum (11.4%). The net profit of bulls of group II was higher by 1268.8 and 1398.0 thousand soums compared to their peers. The level of profitability was 17.2 in group I, 26.9 in group II and 15.4% in group III.

### **Discussion of research results.**

The peculiarities of the influence of intensive rearing on the meat productivity of the lagging young cattle of Simmental breed and the ways of rational using the genetic possibilities of the animals of the studied groups to increase the production of high-quality beef and to raise the profitability of the branch have been revealed. The experimental data replenish the scientific information and substantiate the complex research on improving the Simmental breed and allow to give practical recommendations on organization of growing young animals with regard to weight and age specifics. The established biological laws of growth

and development of tissues supplement and expand the ideas about the quantitative and qualitative estimation of meat productivity of young animals.

**Conclusions.** The conditions created for intensive rearing of experimental bulls to realize the genetic potential of meat productivity were satisfactory. At the same time, the animals of different groups, reacted to them differently, which influenced the intensity of growth and the indicators of meat productivity.

1. The intensive technology of growing steers of group II with 10-15% more nutritious diets were inferior to their peers of group III (with 20-25% more nutritious diets) in consumption of fodder units in the diet but still provided sufficiently high indicators. By the age of 18 months the live weight of bulls of the 1st group reached  $571,3 \pm 11,2$  kg, the 2nd group  $523,4 \pm 11,8$  kg, the 3rd group  $473,9 \pm 9,9$  kg ( $P \leq 0,999$ ). Feed consumption per 1 kg of gain by group was 8.46; 8.25; 9.33 feed units and 916; 894 and 1022 g of digestible protein, respectively.

2. Group III steers, despite the 20-25% increase in diet nutrition, were inferior to Group I and II steers in terms of live weight during all age periods. When bred for experiment their live weight was 50,3 and 20,6 kg lower accordingly, at 9 months by 47,9 and 29,3 kg, at 12 months - 45 and 37,5 kg, at 15 months - 42,2 and 43 kg, at 18 months - 43,4 and 49,5 kg. ( $P \leq 0,999$ )

3. At staging, experimental steers of groups II and III were inferior in live weight to the control group by 16% and 35.3%, respectively. Increasing the nutritive value of the diet of bulls of Group II by 10-15% enabled to shorten the lag



during the following breeding periods and by the age of 15 months to fully liquidate the lag and to leave the control group behind by 1.2% (6.1 kg) at the end of the experiment. Group III-bulls, despite increasing the intensity of feeding by 20-25%, could not completely cover the lag in live weight by the end of the experiment, but reduced it to 9.1% (43.4 kg).

4. Increasing the level of feeding of experimental steers by 10-25% improved the meat indicators. Thus, bulls of the group II at the age of 18 months surpassed their coevals in the pre-slaughter weight by 2.7-47.4 kg, in the carcass weight by 0.7-30.3 kg and in the slaughter weight by 2.4-8.3 kg. The slaughter yield was 55.6% in the control

group I; 55.8% in group II and 55.2% in group III.

5. At 7 months of age the weight of the muscles under study in control steers was 20.84 kg, which was 5.5 kg (39.0%) more than in group I and 8.3 kg (74.4%) more than in group III. Increasing the level of feeding of steers of experimental groups stimulated an increase in the weight indices of the musculature. At 18 months of age the weight of muscles in bulls of group II (increase in feed nutrition by 10-15%) was 86.9 kg, which is 2.6 kg (3.1%) more than in group I and 14.1 kg (19.2%) more than in group III. In turn, Group III steers were 11.5 kg (15.7%) inferior to the control group.

## REFERENCES:

1. Ayrich V. A. Influence of Sudanka fodder on the growth of beef steers. *Zootehnia*. 2002. - №7. - C. 14-15.
2. Akmal Khanov Sh.A. Chorva mollarini yil davomida bir hil oziklantirish afzalligi. *Zooveterinary zh.-Toshkent*, 2010.- № 3.-27-28 b.
3. Amerkhanov H.A. Theory and practice of meat cattle breeding. - M.; 2004. 320 p.
4. Belyaev, A. Meat productivity of Simmentals of different genotypes. *Dairy and beef cattle breeding*. 2004. - №1. - C. 2-3.
5. Gosteva E.R., Kozlova N.N., Ulimbashev M.B. - Meat productivity of Simmentals of different genotypes *Vestnik of Altai State Agrarian University* № 7 (153), 2017
6. Gutkin S. S. Features of tissue growth in cattle of different breeds. *Zootehnika*. 2003. - №3. - C. 31.
7. Dorotyuk E.N. Accelerated rearing of young cattle is an important reserve for increasing beef production. In: "Industrial fattening of cattle on an inter-farm basis. Orenburg, 1977.
8. Levantin D.L. The growth of the skeleton and muscles and changes in the ratio in the carcass of cattle with age. In: *Biological, bases of improvement of meat qualities of animals*. Kiev: UASKHN, 1962. 52-66.
9. Svechin KB Compensatory reactions of the body of animals in ontogenesis of cattle and the formation of their productivity. Kiev, 1966.
10. Khidirov I., Khabibullin K.Kh. Intensification of beef production. Tashkent, Mehnat, 1989.
11. Khidirov K.I., Ruziev R.I. Ÿsishdan kolgan holshtinlashtirilgan kora-ola zotga mansub bukalarni jadal ustirish. Tashkent, 1998, 134 b.



12. Dutton S., Simmental beef can earn quality bonus/7-Farmer Weekly.- 1981.- v. 94.-N 17.-p. 51.      184. Dymnicki, E. Growth rate, feed intake and feed conversion in fattening bull of main beef breeds kept in Poland/E.Dymnicki, J. Oprz^dek, Z. Reklewski, K. Sloniewski, A. Oprz^dek, J. Krzyzewski//Anim. Sci. Pap. and Repts. 2001. -19, №3.-P. 231-239.