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Forming the quality indicators to beef by feed additives "Yoddar-Zn" and "Glimalask-Vet".

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ABSTRACT

The results of these study revealed a positive effect feed additives "Yoddar-Zn" and "Glimalask-Vet" to forming quality indicators of meat young cattle. Established, that more efficiency of feed additives is achieved by complex its use. So, meat of extra-class from carcasses of calves, which consumed "Yoddar-Zn» and «Glimalask-Vet» (I group), were more than analogues of control by 6,48 kg, and meat from calves which consumed only "Yoddar-Zn» (II group) – 3,50 kg, the first-class - by 15,19 and 7,86 kg. Calves of experimental groups had more intense integral characteristics of meat color. The flesh from carcasses of calves experimental groups contained fat more than in control by 0,13 and 0,07%, protein - by 1,79 and 0,97%, energy - by 304,3 MJ or 18,17%, and 146,8 MJ or 8,77%. The meat of calves, which consumed feed additives, had more essential amino acids. Protein quality indicator its meat was higher than of control by 0,73 and 0,28, an amino acid index - by 0,17 and 0,04. Meat, which obtained from calves of experimental groups, had higher culinary and technological parameters, optimal fractional composition of muscle protein and lipid composition of adipose tissue, better digestibility.

Keywords: feed additive, chemical and biochemical composition, amino acids, culinary and technological index, lipid composition, meat.

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INTRODUCTION

At the present stage of development of animal husbandry in Russia the most important problem remains increase production competitive beef.

The competitiveness of meat depends on its cost price and quality. The quality of beef, according to scientists, is influenced by genetic and paratypic factors [1]. At the same time of all multiple paratypic factors, the most significant effect on the quality of meat products give the level and adequacy of feeding [2, 4, 6, 7].

The high efficiency of use the feed additives in diets for calves, growing for meat, is had proven by many studies [8, 9]. Revealed that the most effective has feed additives, which contain microelements in the organic form and organic acids [10, 11, 12].

In this paper, presents study the effect of new feed additives "Yoddar-Zn" and "Glimalask-Vet" on indicators beef quality.

Dietary supplement "Yoddar-Zn» is based on iodine and zinc in organic form, and "Wet-Glimalask" - based on the amino acid glycine and organic acids - malic and ascorbic.

MATERIALS AND METHODS

For the experiment were formed 3 groups of 10 goals each of calves Kazakh white-head breed by comparative method at the age of 12 months. The calves of control group consumed a general economic diet, I group - general economic diet with feed additive "Yoddar-Zn" on the basis of 100 g per 1 ton of feed, and "Glimalask-Wet" at on the basis of 400 g for calf, II group - basic diet and feed additive "Wet-Glimalask" at the same dosage.

The calves were keeping separately by groups, general diet is had calculated to get the average daily gain of 950-1000 g. Monitoring calves lasted for 6 months. By the end of experience, the live weight of calves at the age of 18 months by groups amounted 505.3; 540.1 and 525.7 kg. By weight of carcasses calves I and II experimental group, slaughtered at the age of 18 months, exceeded analogues of control by 8.34 (P> 0.99) and 4.30% (P> 0.95), weight of flesh - 9,67 (P> 0.999) and 3.93% (P> 0.95).

RESULTS AND DISCUSSION

During the research had been establish, that feed additives had a positive impact on the quality beef produced.

The quality flesh of carcasses characterized by such indicators as meat yield by sorts. We had studied the sort composition the flesh of carcass by classification for sausage. In the process of trimming had established that meat of extra-sort in carcasses of calves I and II experimental groups, were more than analogues of control by 6.48 kg or 18.33% (P> 0.999), and 3.50 kg, or 9.90% (P> 0.999), the first-sort - by 15.19 kg and 13.22% (P> 0.999) and 7.86 kg or 6.84% (P> 0.999) (Table 1).

Table 1: Varietal composition trimming meat of experimental calves(averageper 1 animal), kg

Indicators	Groups		
	Control	I Group	II Group
Flesh weight of carcass	216,40±1,36	237,31±1,01	224,90±1,42
incl.:			
extra-sort	35,36±0,17	41,84±0,19	38,86±0,14
% By weight of the flesh	16,34	17,63	17,28
first-sort	114,93±0,98	130,12±1,23	122,79±1,19
% By weight of the flesh	53,11	54,83	54,60
second-sort	66,11±0,47	65,35±0,58	63,25±0,54
% By weight of the flesh	30,55	27,54	28,12

Chemical analysis revealed that average fat content into the samples of meat, I and II experimental groups was more than control by 0.18 and 0.07 %, protein - 1.79 (P> 0.95) and 0.97 %. Dry matter into the flesh of carcasses calves of experimental group was more by 1.93 (P> 0.95) and 1.05%.

The flesh of carcasses calves I experimental group which consumed feed additives "Yoddar-Zn" and "Glimalask-Vet" by complex, contain more fat than analogues of II group, 0.51%, protein - 0.21 and dry matter - 0.80% (Table 2).

Table 2: Chemical and biochemical composition of an average sample flesh carcasses of experimental calves

Indicators	Groups		
	Control	I Group	II Group
Dry matter, %	31,27±0,23	33,30±0,25	32,50±0,12
Fat content,%	11,85±0,36	13,10±0,15	12,59±0,37
Protein,%	18,39±0,16	19,07±0,36	18,86±0,43
Ash,%	1,02±0,02	1,13±0,09	1,04±0,07
Hydroxyproline,mg	70,06±0,96	64,39±1,23	68,41±1,04
Tryptophan,mg	387,98±1,97	403,68±1,75	398,12±2,03
Proteinqualityindex	5,54	6,27	5,82

Meat of calves from experimental groups had a higher biological value. In the meat of calves I and II test groups contained more tryptophan than control by 15.70 kg, or 4.05% (P> 0.999) and 1.40 kg or 2.62% (P> 0, 99). The protein quality index of their meat was higher by 0.73 and 0.28. A similar result is had set in analysis of quality of the eye muscle (Table. 3).

Table 3: The chemical and biochemical composition of eye muscle

Indicators	Groups		
	Control	I Group	II Group
Dry matter, %	23,73±0,46	25,66±0,28	24,78±0,49
Fatcontent,%	1,41±0,07	1,54±0,13	1,48±0,15
Protein,%	21,21±0,51	23,00±0,23	22,18±0,61
Ash,%	1,11±0,02	1,12±0,03	1,12±0,04
Hydroxyproline,mg	65,40±1,75	59,16±1,32	60,20±1,40
Tryptophan,mg	412,63±1,69	429,50±2,85	421,40±1,98
Proteinqualityindex	6,31	7,26	7,00

The fat content into the eye muscle of calves I and II experimental groups was more than control by 0.07 to 0.13%, protein - 1,29 (P> 0,95), and 0.97%. Protein quality index was more thananaloguesby 0.25to 0.69.

An important indicator of the consumer value of meat is the ratio of fat to protein. In this experience, the optimal ratio of fat to protein was in the meat of calves consuming feed additives in the complex. The ratio of fat to protein in the average sample of flesh from control group was 1: 0,64, I group – 1: 0.69 and II group – 1: 0.67.

The research results indicate that meat obtained from calves of experimental groups reached physiological maturity, and it can be attribute to the dietary product.

Into the flesh of carcasses calves I and II experimental groups are the protein more thancontrol by 5.45 kg, or 13,70% (P> 0,999), and 2.62 kg, or 6,59% (P > 0.999), energy - to 304.3 MJ, or 18,17% (P> 0,999), and 146.8 MJ, or 8,77% (P> 0,999) (Table 4).

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Table 4: Yield of nutrients

Indicators	Groups		
	Control	I Group	II Group
Protein, kg	39,80±0,13	45,25±0,16	42,42±0,11
Fat, kg	25,64±0,10	31,09±0,08	28,31±0,09
The energy value of 1 kg flesh, MJ	7,74±0,19	8,34±0,13	8,10±0,15
Energy value of the entire carcass flesh, MJ	1674,9±12,37	1979,2±10,56	1821,7±14,02

In-depth study amino acid composition of eye muscle from experimental calves revealed that the essential and nonessential amino acids were contain more in the meat of calves, which consume feed additives.

The containessential amino acids in muscle calves of experimental groups were more than control by 1.13 and 0.55%, and nonessential - 0.76 were less by 0.04%. The content of all essential amino acids except histidine and methionine, were more in calves of experimental groups. Differences in favor to I and II of test groups, by content essential amino acid lysine was 0.28 and 0.47%, arginine - 0.22 and 0.14% histidine - 0.39 and 0.12% (Table. 5).

Table 5: The composition and contents amino acids into the eye muscle

Indicators	Groups		
	Control	I Group	II Group
Lysine	2,15	2,43	2,62
Histidine	1,29	1,16	1,21
Methionine	0,72	0,68	0,65
Arginine	1,36	1,58	1,50
Threonine	1,18	1,02	1,26
Valine	1,32	1,58	1,40
Isoleucine	0,94	1,33	1,06
Leucine	1,97	2,21	2,13
Phenylalanine	0,71	0,78	0,76
The amount of essential amino acids	11,64	12,77	12,59
Asparticacid	2,38	2,13	2,16
Serin	0,93	0,90	0,95
Glutamicacid	3,56	3,61	3,68
Proline	1,30	1,36	1,32
Glycine	1,36	1,09	1,13
Alanine	1,37	1,22	1,14
Cystine	0,38	0,29	0,31
Tyrosine	0,71	0,63	0,68
The amount of nonessential amino acids	11,99	11,23	11,37
Aminoacidindex	0,97	1,14	1,11

The relatively high content essential amino acids in the muscle of calves, which consumed feed additives, give higher rates of amino acid index, which indicates a high biological value meat derived from them. It was establish that calves of I Group had the highest rate amino acid index. For example, the amino acid index was higher in calves I test group than control by 0.17 and II group - 0.04.

An important criterion quality meat, are its culinary and technological qualities. In this studies, we had studied water-holding capacity, pH, culinary and technological parameters (tab. 6).

Table 6: Culinary and technological properties of the eye muscle

Indicators	Groups		
	Control	I Group	II Group
pH	5,65±0,05	5,81±0,07	5,89±0,05
water-holding capacity	62,3±0,21	63,1±0,19	62,8±0,12
culinary and technological parameters	1,78±0,01	1,91±0,03	1,83±0,02

Water-holding capacity of meat calves I and II experimental groups was higher than control by 0,8 (P> 0,95), and 0.5%. The values of culinary and technological index were more by 0.13 and 0.05.

The important properties of meat is its digestibility in the human body. The most convenient to determine the degree of digestibility of meat in laboratory conditions *in vitro* method.

The results of these studies had revealed that by influence of pepsin and trypsin highest rates of digestion had characterized meat from calves of control group. So the meat calves of control group had digestibility is higher than analog I and II experimental groups by 0,5 (P> 0,95) and 0.2% trypsin - 1,1 (P> 0,999) and 0,4% (P> 0,99). Total digestion of meat in the control group calves were respectively higher by 1,6 (P> 0,99) and 0,6% (P> 0,95).

Collagen cooking property of meat calves from control group was higher than analogs I and II experimental groups, at 1,8 (P> 0,99) and 1,1% (P> 0,99), redox potential - 2 42 and 3,41% (P> 0,95) (Table. 7).

Table 7: The digestibility in vitro, and the redox potential of meat

Indicators	Groups		
	Control	I Group	II Group
The digestibility, mg tyrosine / g protein:			
pepsin	12,1±0,08	11,6±0,06	11,9±0,07
trypsin	13,4±0,05	12,3±0,09	13,0±0,04
total	25,5±0,11	23,9±0,14	24,9±0,10
Collagen cooking property	61,9±0,28	60,1±0,21	60,8±0,25
Redoxpotential mV	139,8±0,86	136,5±1,21	135,2±0,92

Studies revealed that the fractional composition of muscle protein experimental calves is vary depending of food additives. Into the protein of muscles calves from I and II experimental groups the sarcoplasmic proteins contained more than control by 0,31 (P> 0,95) and 0.12%, myofibrillar - 0.26 and 0.19% and stroma - 0.11 and 0.16% (Table. 8).

Table 8: Fractional composition of muscle protein meat

Indicators	Groups		
	Control	I Group	II Group
Total protein,%	18,39±0,16	19,07±0,36	18,86±0,43
protein fraction:			
Sarcoplasmic, %	3,41±0,11	3,72±0,08	3,53±0,06
Myofibrillar, %	7,50±0,18	7,76±0,13	7,69±0,15
Sroma, %	7,48±0,14	7,59±0,12	7,64±0,15
Complete protein index	1,46	1,52	1,47

The ratio of the most biologically valuable digestible protein fractions flesh of carcasses (sarcoplasmic and myofibrillar) to the less valuable and difficult digestible (stroma) was the most optimal from calves I and II experimental groups. Complete protein index had been higher in comparison with the control by 0.06 and 0.01%.

In the work of several researchers noted the need to take account color of meat, because this indicator is affect to marketability and nutritional value. Chromaticity of meat is closely related with content the blood, and hence, hemoglobin in the meat.

Results of integrated color indices meat from experimental calves revealed that most intense L-pale was in animals consuming feed additives. The intensity of L-pale of meat calves I and II experimental groups was higher than control by 5,98 (P> 0,99), and 4,55% (P> 0,95), b-yellowing - 15 86 (P> 0,99) and 9,90 (P> 0,99). Integral indicator a-pink meat was more intense in the control group calves by 8,38 (P> 0,99) and 4,21% (P> 0,95) (Table. 9).

Table 9: Color indicators of eye muscle from experimental calves, nm

Indicators	Groups		
	Control	I Group	II Group
L-pale	41,18±0,52	43,64±0,89	43,05±0,78
b-yellowing	28,74±0,39	26,52±0,24	27,58±0,31
a-pink	8,39±0,20	9,75±0,35	9,22±0,27

Consumer properties of meat depends from lipid composition. The studies revealed that into adipose tissue from calves, content lipids triglycerides and phospholipids are not significantly changed.

There was marke a trend toward higher content of triglycerides in adipose tissue of calves of the control group, phospholipids, cholesterol and cholesterol esters - I and II experimental groups.

Containing the triglyceride into fat tissue of calves I and II in the experimental groups were less to compared with control by 0.36 and 0.11%. Contain the phospholipids were more by 2.23 and 1.65% cholesterol - by 13,26 (P> 0,99) and 7,78% (P> 0,95) and cholesterol esters - by 4.06 and 2.03 % (tab. 10).

Table 10: The lipid composition of adipose tissue, mg / kg

Indicators	Groups		
	Control	I Group	II Group
Triglycerides	633,2±2,86	630,9±2,77	632,5±3,02
Phospholipids	291,7±1,63	298,2±1,72	296,5±2,19
Cholesterol	25,19±0,39	28,53±0,41	27,15±0,36
Cholesterolesters	1,48±0,02	1,54±0,03	1,51±0,02

An important element in the comprehensive assessment of quality meat is its organoleptic characteristics. Sensory evaluation of meat from experimental calves carried out on a 5-point scale, taking into account the opinions of experts 5.

Organoleptic evaluation of products did not reveale significant differences. Assessment of broth is had varied by groups from 4.59 to 4.62 points, boiled meat - from 4.49 to 4.51 and a roast meat - by 4.72 and 4.76 points. The total score quality of broth and meat are had varied from 13,80 (I experienced group) to 13.96 points (control group) (Table 11).

Table 11: Results of tasting evaluation of meat, score

Indicators	Groups		
	Control	I Group	II Group
Broth	4,62	4,59	4,61
Meatboiled	4,58	4,49	4,53
Meatfried	4,76	4,72	4,73
Generalscore	13,96	13,80	13,87
Averagescore	4,65	4,60	4,62

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CONCLUSION

Based on the results of research, revealed the positive effect of feed additives "Yoddar-Zn" and "Glimalask-Vet" for qualitative indicators of meat, without negative affecting its organoleptic qualities.

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