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## FEATURES OF INDICATORS OF REPLACEABLE AND NON- REPLACEABLE AMINO ACIDS IN YOUNG CATTLE CUTS

**Abstract.** The article presents the results of a study of nonessential (arginine, proline, serine, alanine, glycine) and essential (lysine, tyrosine, phenylalanine, histidine, leucine + isoleucine, methionine, valine, threonine) amino acids in the cuts of young cattle of Auliekol, Galloway and Hereford stall-fed breeds. The results of studying the total amount of essential amino acids (lysine, tyrosine, phenylalanine, histidine, leucine + isoleucine, methionine, valine, threonine) in commercial cuts of cattle of various breeds have established that, in terms of the number of essential amino acids, the highest indicators are in 3 cuts: the inner part of the hip cut –  $10.05 \pm 0.46\%$ , upper leg, long-cut –  $10.345 \pm 0.48\%$ , flank –  $13.82 \pm 0.54$ .

**Keywords:** amino acids, cuts, carcass cutting, carcass weight, young cattle.

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**Introduction.** Most amino acids can be synthesized by the body during metabolism. Other (irreplaceable) amino acids: lysine, histidine, arginine, threonine, methionine, valine, leucine, isoleucine, phenylalanine, and tryptophan are not synthesized, which requires additional inclusion in the diet.

The measure of total metabolism in animals is the efficiency of the use of absorbed amino acids for deposition from the total pool of protein that entered the body with the feed, the limiting value of which in individual feeds is not shown for polygastric animals. Amino acid deficiency is accompanied by metabolic disorders, reduced growth, development and economic efficiency of growing productive animals. There are several ways to modify the amino acid composition by using proteins that are resistant to degradation in the rumen and have an amino acid

profile available to the animal body. Only due to this it is possible to favorably complement the composition of the proteins of rumen microorganisms. Another significant way to regulate amino acids in the gut is through the use of chemically isolated synthetic amino acids [1].

Inclusion of high amino acids in the diet stimulates early maturity of beef type animals, i.e. natural stimulation at an early age ensures obtaining of slaughter conditions and quality characteristics of meat by 15- 18 months of age [2-3].

Our findings are consistent with Huang VJ colleagues (2016), who, using a mixture of amino acids, found that lysine and methionine are the first critical amino acids in cattle diets. It is known that lysine participates in the synthesis of nucleoproteins and hemoglobin. He is inert in these metabolic processes. The irreplaceable amino acid methionine is involved in the formation of creatinine, choline, noradrenaline, etc. Scientists have found that a lack of this amino acid impairs the metabolism and many organs [4-6].

**Materials and methods.** The amino acid composition of proteins was determined on an amino acid analyzer “Kapel 105M”. Amino acid balance of meat products was characterized by amino acid scoring and biological value criteria: amino acid coefficient, coefficient of protein snailiness, indicator of comparable redundancy of amino acid composition of protein.

**Research results.** Calves of Auliekol, Galloway and Hereford breeds with an average weight of 220-225 kg, at the age of 10 months at the beginning of the experiment.

Study of replaceable (arginine, proline, serine, alanine, glycine) and irreplaceable (lysine, tyrosine, phenylalanine, histidine, leucine + isoleucine, methionine, valine, threonine) amino acids in cuts of young cattle of Auliekol, Galloway and Hereford breeds of stall-fed.

We studied the amino acid composition of the main 14 trade cattle cuts of two different breeds of stall-fed - Auliekol and Galloway. The results of the studies have been placed as diagrams in Figures 1 and 2.

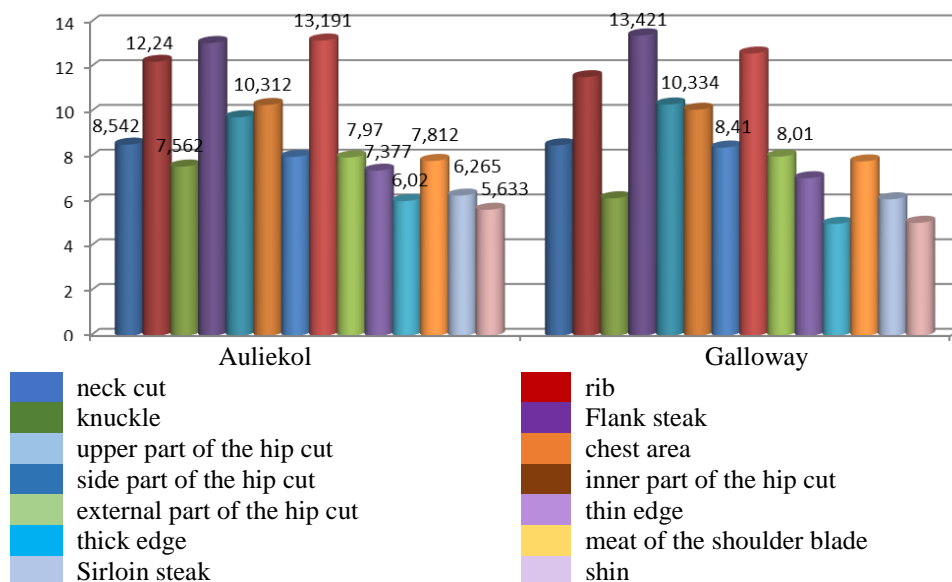


Fig. 1. Replaceable amino acids of basic cuts of cattle of Auliekol and Galloway breeds of stall-fed, %

The study of replaceable amino acids (arginine, proline, serine, alanine, glycine) in 14 cuts of cattle of Auliekol and Galloway breeds of stall-fed found that the amount of the above amino acids favorably differs Auliekol breed in 10 cuts: neck cut – 8.542%, rib – 12.24%, knuckle – 7.562% , chest area – 10.312%, inner part of the hip cut – 13.191%, thin edge – 7.377%, thick edge – 6.02%, meat of the shoulder blade – 7.812%, Sirloin steak – 6.265%, shin – 5.633%), and the Galloway breed in 4 (Flank steak – 13.421%, upper part of the hip cut – 10.334%, side part of the hip cut – 8.41%, external part of the hip cut – 8.01%).

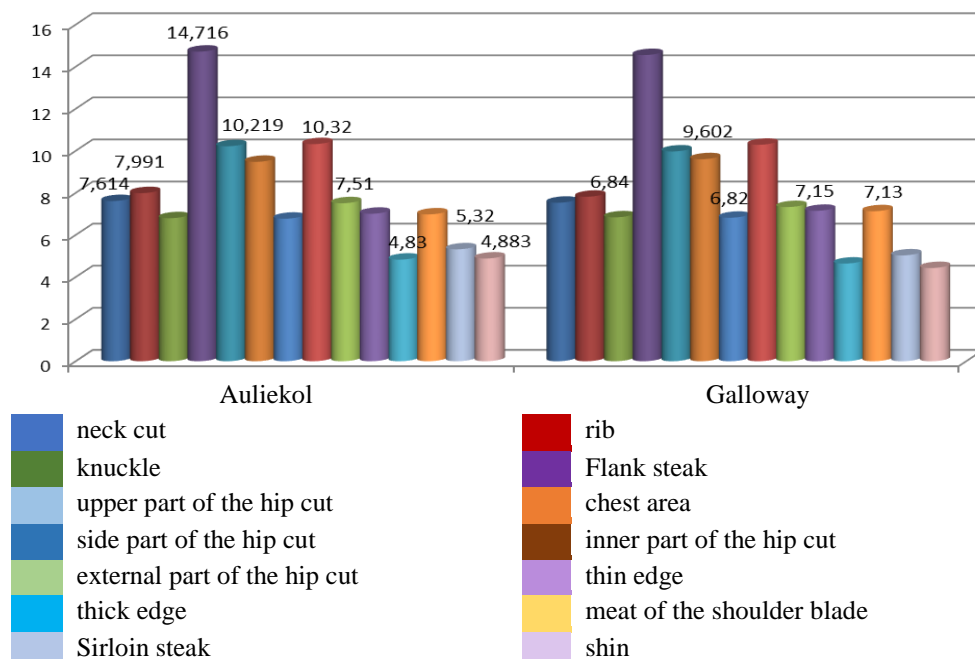


Fig. 2. Irreplaceable amino acids of basic cuts of cattle of Auliekol and Galloway breeds of stall-fed, %

The study of the total number of irreplaceable amino acids (lysine, tyrosine, phenylalanine, histidine, leucine + isoleucine, methionine, valine, threonine) found that the number of irreplaceable amino acids is highest in 9 cuts of Auliekol breed (neck cut – 7.614%, rib – 7.991%, Flank steak – 14.716%, upper part of the hip cut – 10.219% , inner part of the hip cut – 10.32%, external part of the hip cut – 7.51%, thick edge – 4.83%, Sirloin steak – 5.32%, shin – 4.883%) and 5 cuts of Galloway breed (knuckle – 6.84%, chest area – 9.602%, side of the hip cut – 6.82%, thin edge – 7.15%, meat of the shoulder blade – 7.13%).

We also studied the replaceable (arginine, proline, serine, alanine, glycine) and irreplaceable (lysine, tyrosine, phenylalanine, histidine, leucine + isoleucine, methionine, valine, threonine) amino acids in cuts of young cattle of Hereford breed (Figs. 3 and 4).

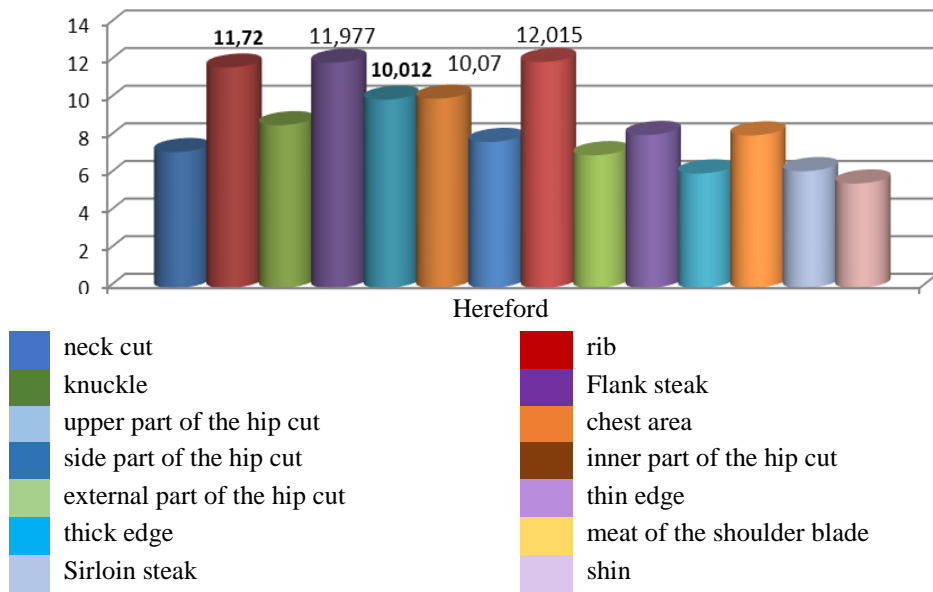


Fig. 3. Replaceable amino acids of Hereford cattle cuts, %

When examining the replaceable amino acids in 14 cuts of cattle of a Hereford breed of stall-fed, it was found that the amount of the above amino acids favorably differs in the following cuts: part of the hip cuts –  $10.012 \pm 0.45\%$ , chest area –  $10.07 \pm 0.46\%$ , rib –  $11.72 \pm 0.49\%$ , Flank steak –  $11.977 \pm 0.51\%$ , inner part of the hip cut –  $12.015 \pm 0.52\%$ .

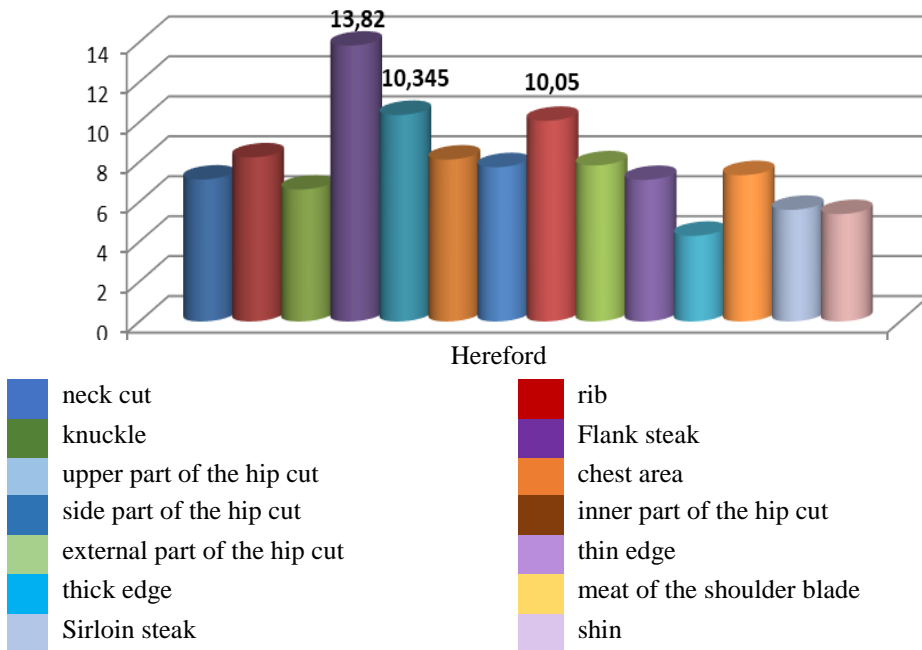


Fig. 4. Irreplaceable amino acids of Hereford cattle cuts, %

The result of studying the total amount of irreplaceable amino acids (lysine, tyrosine, phenylalanine, histidine, leucine + isoleucine, methionine, valine,

threonine) in trade cattle cuts of different breeds found that by the number of irreplaceable amino acids the highest indicators for 3 cuts (inner part of the hip cut –  $10.05 \pm 0.46\%$ , upper part of the hip cut –  $10.345 \pm 0.48\%$ , Flank steak –  $13.82 \pm 0.54$ ). We analyzed the amino acid composition of beef from various literature sources near and far abroad. The results are in Table 1.

Table 1  
Content of amino acids in beef (in % of the eatable part of product)

Name of amino acids	Sources			
	Amino acids % MedlinePlus Encyclopedia, 2015	"Merchandise's Handbook: Food Taxonomy" www.comodity.ru	"Amino Acids in Human Nutrition" by Yu.A. Lysikov, State University Institute of Nutrition	Skurikhin I.M. "Tables of Chemical Composition and Caloric Content of Russian Foodstuffs".
<i>Replaceable, in %:</i>				
arginine	1.27	1.03	0.65	1.04
proline	0.7	0.7	0.68	0.69
serine	0.78	0.79	0.76	0.78
alanine	1.12	1.1	1.13	1.09
glycine	1.19	0.91	0.9	0.94
<i>Irreplaceable, in %</i>				
lysine	1.66	1.59	0.86	1.59
tyrosine	0.63	0.65	0.65	0.66
phenylalanine	0.77	0.71	0.45	0.8
histidine	0.63	0.45	0.3	0.71
leucine	1.56	1.48	0.87	1.48
isoleucine	0.89	0.78	0.45	0.78
methionine	0.51	0.44	0.32	0.45
valine	0.97	1.03	0.59	1.03
threonine	0.78	0.8	0.53	0.8
tryptophan	0.13	0.21	0.12	0.21
Total:				
Replaceable	5.06	4.53	4.12	4.54
Irreplaceable	8.53	8.14	5.14	8.51
general	13.59	12.76	9.26	13.05

In a study of the replaceable and irreplaceable amino acids in beef, based on various sources, we were able to find that almost identical figures in proline – 0.68-0.7%, serine – 0.76-0.79%, alanine – 1.09-1.13%, tyrosine – 0.63-0.66%; But there are also significant differences among the authors, for example, arginine – from 0.65 to 1.27%, lysine from 0.86 to 1.66% and Leucine from 0.87 to 1.56%. The highest indicator for total amino acid composition 13.59%, and the lowest – 9.26%.

**Discussion of scientific results.** Thus, studies of the total amount of essential amino acids (lysine, tyrosine, phenylalanine, histidine, leucine+isoleucine, methionine, valine, threonine) in commercial cuts of cattle of different breeds have given us the following indicators that the number of essential amino acids is highest in 3 cuts – inner part of the hip cut, upper part of the hip cut, flank steak. These studies allowed us to analyze the amino acid composition of beef according to various literature sources from near and far abroad.

**Conclusion.** Thus, we studied the amino acid composition of natural anatomical parts of the Auliekol, Kazakh white-headed and Gallovia cattle breeds. The study of replaceable amino acids (arginine, proline, serine, alanine, glycine) in cattle cuts of different breeds found that the number of the above amino acids favorably differs Kazakh white-headed breed in 7 cuts; Auliekol breed – 1; Galloway – 1. The result of studying the total amount of irreplaceable amino acids (lysine, tyrosine, phenylalanine, histidine, leucine + isoleucine, methionine, valine, threonine) in trade cattle cuts of different breeds found that the highest indicators for the number of irreplaceable amino acids in 5 cuts of Kazakh whitehead breed; Auliekol breed – 3; Galloway – 1.

We studied replaceable (arginine, proline, serine, alanine, glycine) and irreplaceable (lysine, tyrosine, phenylalanine, histidine, leucine + isoleucine, methionine, valine, threonine) amino acids in cuts of young cattle of Auliekol, Galloway and Hereford breeds of stall-fed. As a result, we determined that in terms of the number of the above-mentioned replaceable amino acids favourably differs Auliekol breed in 10 cuts: neck cut – 8.542%, rib – 12.24%, knuckle – 7.562% , chest area – 10.312%, inner part of the hip cut – 13.191%, thin edge – 7.377%, thick edge – 6.02%, meat of the shoulder blade – 7.812%, sirloin steak – 6.265%, shin – 5.633%), and the Galloway breed in 4 (Flank steak – 13.421%, upper part of the hip cut – 10.334%, side part of the hip cut – 8.41%, external part of the hip cut – 8.01%); irreplaceable amino acids are highest in 9 cuts of Auliekol breed (neck cut – 7.614%, rib – 7.991%, Flank steak – 14.716%, upper part of the hip cut – 10.219%, inner part of the hip cut – 10.32%, external part of the hip cut – 7.51%, thick edge – 4.83%, sirloin steak – 5.32%, shin – 4.883%) and 5 cuts of Galloway breed (knuckle – 6.84%, chest area – 9.602%, side part of the hip cut – 6.82%, thin edge – 7.15%, meat of the shoulder blade – 7.13%).

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### **ЖАС ІРІ ҚАРА МАЛЫНЫҢ АНАТОМИЯЛЫҚ БӨЛІГІНІҢ АЛМАСТЫРҒЫШ АМИНҚЫШҚЫЛДАРЫН ЖӘНЕ АМИНҚЫШҚЫЛДАР КӨРСЕТКІШТЕРІНІҢ ЕРЕКШЕЛІКТЕРІ**

**Аңдатпа.** Әулиекөл, галловей және герефорд тұқымдарынан жас ірі қара малдың табиғи анатомиялық бөлігінің алмастырғыш аминқышқылдары (аргинин, пролин, серин, аланин, глицин) және маңызды аминқышқылдары (лизин, тирозин, фенилаланин, гистидин, лейцин + изолейцин, метионин, валин, треонин) зерттелінді. Зерттеу нәтижесінде әр түрлі тұқымды ірі қара малдың коммерциялық кебекіндегі алмастырылмайтын аминқышқылдарының (лизин, тирозин, фенилаланин, гистидин, лейцин+изолейцин, метионин, валин, треонин) жалпы санын зерттеу нәтижелері алмастырылмайтын аминқышқылдарының саны бойынша ұшаның 3 бөлігінде ең жоғары көрсеткіш анықталды: жамбас кесуінің ішкі бөлігі –  $10,05 \pm 0,46\%$ , жамбас кесуінің жоғарғы бөлігі –  $10,345 \pm 0,48\%$ , Пашина –  $13,82 \pm 0,54$ .

**Тірек сөздер:** амин қышқылдары, кесектер, ұшаларды мүшелу, сойыс салмағы, ірі қара малдың төлі.

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### **ОСОБЕННОСТИ ПОКАЗАТЕЛЕЙ ЗАМЕНИМЫХ И НЕЗАМЕНИМЫХ АМИНОКИСЛОТ В ОТРУБАХ МОЛОДНЯКА КРУПНОГО РОГАТОГО СКОТА**

**Аннотация.** В статье представлены результаты исследования заменимых (аргинин, пролин, серин, аланин, глицин) и незаменимых (лизин, тирозин, фенилаланин, гистидин, лейцин + изолейцин, метионин, валин, треонин) аминокислот в отрубях молодняка крупного рогатого скота аулиекольской, галловейской и герефордской породы стойлового откорма. Результаты изучения общего количества незаменимых аминокислот (лизин, тирозин, фенилаланин, гистидин, лейцин+изолейцин, метионин, валин, треонин) в торговых отрубях КРС различных пород установили, что по количеству незаменимых аминокислот самые высокие показатели у 3 отрубев: внутренняя часть тазобедренного отруба –  $10,05 \pm 0,46\%$ , верхняя часть тазобедренного отруба –  $10,345 \pm 0,48\%$ , пашина –  $13,82 \pm 0,54$ .

**Ключевые слова:** аминокислоты, отрубы, разделка туш, убойный вес, молодняк крупного рогатого скота.