The use of the meal prepared from horns and hooves of slaughter animals as a growth stimulator

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Within recent years the researchers in cattle feeding were concentrating on keratin-containing raw materials which are rich in protein. However, the basic protein keratin in its native form is not, practically, assimilated by the body and, therefore, the feed-stuffs prepared from this scleroprotein are of a low nutritive and biological value /1/. Numerous efforts on the processing of keratin-containing materials (of slaughter animals' horns and hooves, in particular) with acids and alkalis are known /2-5/, but the free amino acids released - some essential ones among them - are destroyed and racemized, and the resulting hydrolyzates do not markedly influence animals' weight gains during fattening, as well as their productivity /6,7/.

To hydrolytically split the peptide links in a keratin molecule, the enzymic treatment is being applied to a greater extent, since it allows to eliminate a tough effect on the protein molecule, amino acid decomposition, to select a system of enzymes and processing parametres and to develop optimum processing technologies of the raw materials of this type. This paper reports experimental results which show faster growth and development of animals in case of incorporating horn-&-hoof meal, produced from enzymatically treated raw materials, into the feeding rations of animals.

It is worth mentioning that such meal contains more protein and essential amino acids as compared to control samples prepared traditionally, i.e. by means of alkali hydrolysis for 8-10 hr at 90-95°C (Table 1).

Table 1

Amino acids (%) and protein (g) in control and test horn-&-hoof meals

Amino acids, %	Control	Test
1	2	3
Essential		
lysine	3.10	4.71
threonine	4.30	5.02
valine	4.75	4.85
methionine	2.46	3.22
iso-leucine	1.90	2.18
leucine	5.40	6.08
phenyl-alanine	2.48	3.25
	24.39	29.31
Replaceable		
histidine	10.52	11.02
arginine	3.95	4.22
aspartic acid	8.62	8.75
serine	3.92	4.27
glutamic acid	11.04	12.09
proline	4.24	4.85
glycine	12.32	13.08
alanine	6.31	6.54
tyrosine	0.81	0.94
	61.73	65.76
Total	86.12	95.07
Protein, g	75.0	84.3

Thus, it was established that the test sample was of a higher biological value.

To study the nutritive value of the product, experiments were performed on mondescript male rats weighing 48-50 g, randomly divided into 3 groups (20 rats in each). Group I was fed with the standard ration throughout the 42-day experimental period, Group II was given the same ration with 20% of the test horn-&-hoof meal added; Group III received a ration with a synthetic mixture of amino acids added in the quantities similar to those of the test meal. All the rats were weighed and their behaviour and physiological condition were recorded daily.

As is clear from Table 2, test meal incorporation into the standard ration resulted in a progressively increasing rate of weight gains, the latter being considerably higher as compared to control rats, especially within the first 20 days. By the end of the experiment

the average weight of Group II rats was 154.2 g (as compared to 134.0 g for group I rats), i.e. about a 13% increase was observed. Throughout the experiment there were no abnormalities in rats' behaviour or their death-rate. At the same time, the ration with a synthetic amino acid mixture did not increase body weights as compared to controls. With this in view, it can be assumed that the biostimulating effect of horn-&-hoof meal is due both to the keratin hydrolyzate and to other chemical compounds present.

Table 2

Dynamics of rats' weight changes during the feeding period

Ration	No. of rats	Initial weight, g	Changes in weight (g) throughout the experiment					
			1-7 days	8-14 days	15-21 days	22-28 days	29-35 days	36-42 days
Standard	20	46.8± 2.18	67.5±2.18	85.0±0.71	100.4± 0.68	113.0± 0.48	124.2± 1.04	134.0± 1.09
Standard+ 20% horn-&-hoof meal	20	48.5± 2.21	70.2±1.41	93.3±2.04	112.9± 1.32	128.3± 1.81	142.3± 1.21	154.2± 0.94
Standard+ a synthetic amino acid mixture	20	49.2± 1.71	68.3±0.61	82.0±0.64	98.41± 0.78	109.2± 0.51	120.1± 1.41	132.2± 1.41

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