

Production technology of feed protein from biological waste from poultry establishments

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Summary

In article the production technology of high-quality fodder product with high protein content is described. Thanks to a method of extrusive processing of components it is reached not only receiving a forage with high nutritional value and degree of comprehensibility, but also and it is realized new ways of recycling of poultry farming.

Keywords: *Protein feed additives, extruding, digestibility, waste of a bird, feather.*

Introduction

Saturation of the food markets of Belarus and Russia high-quality dairy and meat products of own production is one of the major tasks on the near-term outlook. The satisfaction of the growing requirements of livestock, poultry-farming and fish farms by high-quality compound feeds of own production requires introduction of new technologies and technical re-equipment of the formula-feed enterprises with the perspective modern equipment. For acceleration of terms of the solution of the specified tasks, ensuring rational integration and purposeful use of financial, material and scientific and technical resources of two states the decision on creation and implementation of the joint scientific and technical program of the Union State "Development of perspective resource-saving, environmentally friendly technologies and the equipment for production of biologically full-fledged compound feeds in 2011-2013" was made.

Materials and methods

Traditional technologies, both domestic, and foreign, allow to receive from waste fodder flour with the low content of assimilable protein (digestibility of protein of 25-50%), thus 50–75% of available protein are lost because of rigid temperature hours-long processing. Besides, traditional processing demands considerable power expenses and pollutes environment.

In traditional technological process of processing of waste of an imboweling of a bird use vacuum coppers (Laps's coppers) in which the raw materials layer slowly, usually within 30–120 min., heats up to the critical temperature of sterilization (120 °C) at which the bulk dispute of heatresistant bacteria perishes. As a rule, duration of process of processing makes 6–12 h. Thus the part of raw materials quickly reaches temperature of sterilization and during the rest of the time is exposed to an overheat.

Severe temperature conditions and duration of processing lead to a denaturation of protein and considerable decrease in availability of amino acids, especially a lysine – the main limiting amino acid for a bird. Besides, an essential lack of traditional technology is also that hydrolysis in Laps's coppers practically doesn't affect a feather keratin which share in by-products of an imboweling of a bird makes not less than 50% on a protein. The keratin differs in high resistance to influence of various reagents and isn't split by enzymes of digestive juice of the person, animals and a bird, a t.a almost indigestible.

Considering these factors, and also strengthening of control of observance of the ecological legislation essentially new technologies of processing of waste are required.

Results and discussion

In the developed technology of production of high-quality food product with high protein content in the feedstock used slaughtering waste and bird feather after processing. Mix of previously crushed animal raw materials with a vegetable filler for the purpose of humidity decrease, in the ratio 1: 3-5 is exposed to dry extruding. In a working zone of an extruder at the expense of friction forces, and also in addition due to electric heating temperature of 120-170 °C and pressure of 10-50 atmospheres thanks to what during processing which makes 30-90 sec.

the product will be sterilized is created, there is a hydrolysis of protein and starch to increase in dextrans and the general sugars, deactivation of enzymes of a lipase, trypsin inhibitors, collapse pathogenic (pathogenic) microorganisms. As a result the received product is sterile, available to effect of digestive juice and enzymes, has good digestibility and tastes. Considerable decrease in expenses, in comparison with traditional technology is reached: the electric power - for 5%; metal - for 4%, use of liquid fuel is completely excluded. The analysis of pilot batches of protein feed additives is carried out in the Central research laboratory of bakeries of Department on bakeries of the Ministry of Agriculture and the food of Republic of Belarus. Results of tests showed that extrusive processing of initial components keeps an amino-acid complex, effectively increases nutritional value of proteinaceous feed additive and facilitates its assimilation by a bird. Data on the contents and comprehensibility of a protein are confirmed with test reports.

Table 1 – Results of tests of a sample of a fodder extrudate on a basis a feather - down raw materials and a grain filler

Indicators	Value of an indicator
moisture, %	11,4
a crude protein, %	21,94
a perevarimy protein of «invitro», %	18,28
crude cellulose, %	2,2
calcium, %	0,43
phosphorus, %	0,57
sodium, %	0,14
potassium, %	0,81
crude fat, %	8,97
crude ashes, %	3,2
of crude ashes, insoluble in HCL, %	0,12
Perekisny number, J %	0,19
Total microbic number, WHICH	357000
Sort bacteria a salmonella in 25,0 g	not found
Enteropatogenny types of colibacillus in 1,0 g	not found
Lysine, %	0,93
Methionine, %	0,29
Tryptophane, %	0,16
Cystine, %	0,33
Leucine, %	1,37
Valin, %	0,72
Histidine, %	0,37
Isoleucine, %	0,70
Phenylalanine, %	0,82
Treonin, %	0,94
Arginin, %	1,22

Extrusion feather-down raw material from the slaughter of broiler chickens that crude protein content in the product was 64.2% and the mass fraction of digestible protein, determined by the method «invitro», reached 51.6% or 80.4% in relation a total protein content. As a result of using this technology and set of equipment poultry establishments not only solves the problem of waste from the processing of products, but also produces high-protein digestible feed additive, which leads to the elimination or reduction of purchasing expensive protein components.

References

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