PRODUCTION OF PROTEIN-MINERAL ADDITIVE BASED ON MEAT AND BREWING INDUSTRY WASTES ON YA8-FOB-M LINE

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Background

At present deficit of protein feeds in Russia is more than 25 %, and that of animal feeds , more than 40 %. That is why scientific-research organizations make a search for additional sources of protein in the form of new feed products, utilization of which would allow to increase biological value and producing action of mixed feeds, as well as efficiency of their use by animals and poultry. However, it should be noted, that domestic science and industry are behindhand in solving the problem of expansion of feed additives assortment with utilization of non-traditional raw material sources.

Nevertheless, wastes from brewing industry, and first of all, spent grains, as well as malt sprouts and resting beer yeast, are a very useful feed additive. Beer production at the branch enterprises allows to accumulate more than million tons of spent grains with 70-80 % moisture in the native (not dry) state [1].

Spent grains are characterized by a high level of protein. Attempts of their successful use when feeding cows, pigs, horses, and sheep are known. The feed value of 5 kg of raw spent grains corresponds to that of 1 kg of oats. However, spent grains are favorably distinguished by a more high nitrogen content.

Objective

The objective of this study was to develop technology of production of protein-mineral additive (PMA) using bone flour enriched with beer spent grains based on investigations carried out under laboratory and production conditions.

Investigations on laboratory animals demonstrated, that addition of beer spent grains to meat-bone flour in the amount of 20 % did not lead to side effects in chronic tests and contributed to higher eating of feeds and, consequently, to the growth of animal live weight, compared to the control.

Methods

Production testing of the developed technology of protein-mineral additive was carried out at Moscow meat-packing plant on the equipment of serial production – YA8-FOB-M complex-mechanized bone processing line. In manufactured PMA samples the content of moisture, protein, fat and ash was determined according to GOST 17681-82; amino acid composition – by the method of ion-exchange chromatography on the automatic amino acid equipment for analysis.

Results and Discussion

According to the developed technology, animal raw material (bone after meat boning) is mixed with vegetable raw material (in our case, with spent grains) in 4:1 ratio for pigs and cattle, and in 7:1 ratio – for poultry.

Bone is delivered to the table for examination, then it is grounded in a crusher and transported to the vibration extractor where fat is melted during (3-3.6) x 10^2 s. From the extractor degreased bone is taken to a washer-separator where fat is pressed out and the bone is partially dehydrated. The liquid phase is delivered to a sedimentation centrifuge, and then water emulsion is separated into fat and waste water in RTOM-4.6 separators.

To produce the protein-mineral additive on the line, spent grains delivered to the shop by ground transport (truck) are taken by elevator to a dosing apparatus. From there the brewing spent grains are gravity fed to a crusher to mix with bone scrap. The mixture is transported by elevator to drying blocks. The dried mixture is delivered to a hammer-type crusher, then to the accumulating bunker, and is gravity fed to the vibrating screen. The screened protein-mineral additive is weighted and packed [2].

It has been established, that the manufactured protein-mineral additive meets the requirements of GOST 17536-82 for animal bone flour, what is confirmed by laboratory investigations. After its thermal treatment contamination index doesn't exceed 230 CFU, thou/g. Coliform bacteria, toxigenic anaerobes and salmonella are not present in the protein-mineral additive [3].

The All-Russian Meat Research Institute together with VIZH, VNIITIP and ZAO "Tikhoretsky meat-packing plant" (Krasnodar region) developed BELMIND feed additive for agricultural animals and poultry [4].

Investigations on determining feed value and productive action of PMA based on bone flour and brewery spent grains were carried out on broilers at the experimental poultry farm of VNITIP. It has been established that utilization of PMA instead of meat-bone flour in the amount of 2 and 4 % of the diet doesn't have negative influence on livestock preservation, relative mass of internal organs, muscles and skeleton. It is recommended to feed mixed fodder with 2 % PMA to young poultry stock (aged up to 4 weeks), and then to replace meat-bone flour in the diet by 4 % additive.

At present, when manufacturers of cattle-breeding production are in a hard financial position resulting from change-over to market relations, production of starter mixed feeds for young pigs and demand for them are sharply reduced. It is explained by the high cost of starter mixed feeds because of considerable specific mass of main expensive components (nonfat dry milk and fish flour) entering into their composition.

Utilization of the new PMA with spent grains in the amount of 8 % of mass in mixed feeds for young pigs aged 60-140 days allowed to obtain higher productivity indices, compared to the feeds with equivalent amount of sunflower cake; daily average live mass growth is 403 g, mixed feed expenses being 3.12 kg per 1 kg of growth against 3.45 kg and 366 g, respectively [5].

Such a high-valued component as nonfat dry milk (NDM) is used in starter mixed feeds for calves,. However, its high cost significantly increases prices for starter mixed feeds, what makes problematic utilization of NDM in the practice of young agricultural animals raising. Scientific-economical and balance experiments at "Dubrovitsy" VIZH farm demonstrated, that replacement of 50 and 100 % of NDM and 10 % of sunflower cake by PMA from bone flour and spent grains, did not have negative effect on physical-biological indices and the state of calf organism, digestibility of nutritive substances, intensity and directivity of metabolic processes. Utilization of PMA did not affect taste qualities of mixed feeds [6].

Conclusions

Experimental investigations carried out resulted in the development of technology of production of ecologically clean bone flour-based protein-mineral additive with introduction of brewery industry wastes (spent grains) on YA8-FOB-M complex mechanized line, permitting to improve quality indices of final feed products. Utilization of brewery industry wastes will make possible manufacture of full-valued balanced feeds and improvement of ecological situation at manufacturing plants.

It is possible to raise domestic mixed feed industry at a new up-to-date level and to supply cattle-breeding complexes and poultry plants with feeds only by their purposeful reequipment with modern facilities and new profitable technologies.

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