

Production of Dog Food from Protein Meal Obtained from Processed Poultry Slaughter By- Products

Slavko Filipović

Food Technology Institute, Novi Sad

Vera Radović

Faculty of Agronomy, Čačak

Đorđe Okanović, Milan Ristić, Šandor Kormanjoš,

Food Technology Institute, Novi Sad

Vladimir Dosković

Faculty of Agronomy, Čačak

Abstract: Pet food production is a highly demanding and complex technological procedure involving milling, mixing, extruding, drying, application of liquid components (such as vitamins, amino acids, aroma and colors), cold processing, sieving and packaging.

For the purpose of this investigation, we used slaughtered poultry by-products obtained at slaughtering and primary carcass treatment. Raw material was processed according to dry batch procedure involving defatting step using pressing.

Dog food based on protein meal obtained from processed poultry slaughter by-products according to EU regulations is totally hygienic and safe for use in diets for house pets.

Key words: dog food, extruded protein meal, poultry slaughter by-products.

Introduction

One of major problems associated with feeding younger categories of house pets is the use of proteins of animal origin which have a high biological

value and contain essential amino acids at a ratio similar to that of proteins found in their own tissue (Ristić *et al.* 1996).

Maximum utilization of poultry slaughter by-products obtained in the meat industry enhances the possibility of providing sources of quality proteins, which are necessary for feeding house pets, dogs and cats.

Inedible chicken slaughter by-products account for about 26% of live weight and include the head, legs, complex of internal organs, blood, etc (Ristić *et al.* 1997). The amount of by-products of growth thanks to totally growth of using poultry meat in human diets.

Studies mostly evaluated the use of protein meal of poultry slaughter by-products in diets for pigs and poultry. However, according to EU regulation 1774/2002 prohibiting the use of animal diets in human nutrition, the use of protein meal food for pet diets has increased (Ristić *et al.* 2000).

During the extrusion process, protein structure changes, leading to decreased dissolution but increased digestion of proteins (Filipović *et al.* 2003, 2007). During extrusion, the carbohydrate complex undergoes substantial physical and chemical changes. Corpuscles of starch swell, viscosity and dissolution in cold water change, amylase and amylopectin are released from the starch granule, resulting in increased digestion (Douglas *et al.* 1990).

The objective of this study was to present the technological process of food production for house pets using protein meal obtained from processed poultry slaughter by-products, and technological extrusion process standards (parameters) in dog food production.

Material and Methods

Pet diet was produced under industrial conditions from raw materials: protein meal obtained from inedible poultry slaughter by-products and the addition of maize, whole soybean groats, sunflower pellets, animal yeast, cod-liver oil, technical fat, mineral stuff, feeding mixture, aroma and colors. The protein meal from poultry slaughter by-products is obtained using the dry batching procedure.

Technological processing of dog food production. Technological processing of pet food production includes storage of components inside a silo, component cells and liquid component reservoirs. Measurement and exception of components is done through appropriate worm excluders and electronic batch scale for measuring macro and micro-components. A measured batch of 1000kg is granulated and milled to obtain granulation between 100-300 μ . Following the milling procedure, mixing in a counter-current horizontal mixer is performed, and the mixed mixture undergoes extrusion. Food extrusion commences with the conditioning process involving the addition of technological steam (water rate in conditioner of 90kg/t) at a pressure of 3-5bar and oil at temperature, 25kg/t.

Mixture moisture before entry into the extruder is between 20-25%.

The extrusion temperature is between 122-124°C. Temperature of the extruder cloak is maintained at 130°C by heating with technological steam at extruder cloak. Both head and cloak of the extruder can be cooled with water. Temperature way of work of extruder is totally under the system of automatic work and computer system of regulation. Extruder is single-axle (one worm)

with five segments. Upon extrusion, the extruder is transported into a belt horizontal dryer for dry curing by air circulation (120°C at the entry and 200°C at the exit). After dry curing, a liquid spray of colors, aromas, vitamins and other liquid components is brought into the apparatus used for liquid component application. The obtained house pet food is cooled after sieving, packed into bags and suitable packaging and distributed.

All technical and technological parameters (conditioning, extrusion, drying, addition of aroma, oil and color, cooling procedure, sieving and packaging) are regulated through a computer managing process (Filipović *et al.* 2007).

Laboratory examinations. Samples were taken every 5 minutes after the destruction process to make five average samples: basic chemical composition (moisture, proteins, fat, mineral substance) of protein meal of inedible poultry slaughter by-products and diets for house pets was determined using A.O.A.C., and wiping off products of extruder by A.S.A.E. method (2005).

The total number of microorganisms, number of yeast, mould, isolation and identification of Salmonella and sulfitorreducing Clostridia are determined by Regulation on Methods of Microbiological Analysis and Superanalysis of Victuals (Official Gazette of the SFRY, No. 25, 1980).

For determination of coagulation of positive staphylococcus, Proteus species and Escherichia coli, an internal laboratory method was applied. A total of 50gr of examined sample was measured into a conical flask and 450ml of sterile edible nutritive mass was added. The prepared sample was homogenized and incubated for 24h at 37°C. Isolation and identification were performed according to Regulation on Methods of Microbiological Analysis and Superanalysis of Victuals (Official Gazette of the SFRY, No. 25, 1980).

Results and discussion

The nutritional chemical composition of the protein meal obtained from processed poultry slaughter by-products is given in Table 1.

Tab. 1. Basic chemical composition of protein meal

Basic chemical composition	\bar{x} , %	Sd
Moisture	6.37	0.24
Crude protein	64.30	1.07
Crude fat	12.00	1.05
Mineral matters	12.61	0.74
N-free extract	4.72	1.28

Protein meal obtained from processed poultry slaughter by-products containing 64.30% crude proteins and 12.60% mineral substances, their digestibility being 86% (Ristić *et al.* 2008), according to EU regulations, is safe for use in house pet diets. The quality of the final product is enhanced through satisfaction of the technological parameters of pet diet extrusion.

Physical and chemical characteristics of pet food are presented in Table 2.

Tab. 2. Physical and chemical characteristics of pet food

Quality indicators (%)	\bar{x} , %	Sd
Moisture	5.43	0.37
Crude protein	17.97	0.73
Crude cellulose	4.34	0.98
Crude fat	7.08	1.12
Mineral matters	6.08	1.07
Calcium	1.36	0.54
Phosphorus	0.76	0.03
Sodium	0.20	0.02
Wipe off of extruders	6.10	1.21

The results obtained suggest that the pet food produced contains 18% protein, 7% crude fat, and as low as 5.43% moisture, implying that the product is safe for storage, and can improve the gristly structure. The content of mineral matter and cellulose is common for the categories of dogs that consume the said food. Wiping off extruder of 6.10% is considered satisfactory (values below 10%).

Results of microbiological examinations are presented in Table 3.

Tab. 3. Content of microorganisms in pet diet

Microorganisms		Number
<i>Salmonella</i>	u 50 g	0
Coagulation of positive <i>Staphylococcus</i>	u 50 g	0
Sulphitoreduced <i>Clostridium</i>	u 1 g	0
<i>Proteus</i> sp.	u 50 g	0
<i>Esherichia coli</i>	u 50 g	0
Total number of mould	u 1 g	15
Total number of yeast	u 1 g	0
Total number of microorganisms	u 1 g	82.000

The negligible number of microorganisms (82.000) and mould (15) in the sample (allowed to 10.000) suggests the hygienic safety of products following the process of extrusion, indicating the effect of high-pressure heat steam.

Conclusions

Production of dog food from protein meal obtained from processed poultry slaughter by-products is a complex technological procedure which requires the use of substances of animal, plant and mineral origin of a high nutritional value.

The protein meal, obtained from processed poultry slaughter by-products, containing 64.3% crude proteins of 86% digestibility and 12.60% of mineral substances according to EU regulations, is completely hygienic and safe for use in diet for house pets.

The technological processing of house pet food using the extrusion process is highly complex, involving a high level of technological processing and provides high quality of pet diets.

Acknowledgments: This study was part of the project Safe Destruction of Inedible Animal By-Products in AP Vojvodina by Technical Processing and Major Indicators of Processing Input” financed by the Provincial Secretariat of Science and Technological Development No. 114-451-01458/2008.

References

- ASAE Standard (2005): A.S.A.E. 5269.3.
- Association of Official Analytical Chemistry A.O.A.C. (1984): *Official Methods of Analysis* 14th ed., Washington, D.C.
- Douglas J.H., Sullivan T.K., Bond P.L., Struwe F.J. (1990): Nutrient composition and metabolizable energy values of selected grain sorghum varieties and yellow corn, *Poultry Science*, **69**: 1147-1155.
- Filipović S., Sakač M., Ristić M., Kormanjoš Š., Galić S., Ivanišević S. (2003): Termički postupci obrade žitarica, PTEP – *Časopis za procesnu tehniku i energetiku u poljoprivredi*, **7(1-2)**:, 3-7.
- Filipović, S., Sakač M., Kormanjoš, Š., Savković T., Filipović J., Ristić M. (2007): Uticaj termičkih postupaka na kvalitet hrane za životinje, I međunarodni kongres Tehnologija, kvalitet i bezbednost hrane, *XII Simpozijum Tehnologija hrane za životinje*, Zbornik radova, 108-115.
- Pravilnik o metodama vršenja mikrobioloških analiza i superanaliza životnih namirnica Službeni list SFRJ broj 25, 1980.
- Pravilnik o metodama uzimanja uzoraka i metodama vršenja fizičkih, hemijskih i mikrobioloških analiza stočne hrane, Službeni list SFRJ broj 15, 1987.
- Ristić M., Filipović S., Sakač M., Kormanjoš Š. (1996): *Tehnologija proizvodnje proteinsko-energetskih hraniva od nejestivih sporednih proizvoda zaklane živine*, Monografija, Matica srpska, Novi Sad.
- Ristić M., Sakač M., Kormanjoš Š., Prodanović O., Filipović S. (1997): Kvalitet mesno-koštanog brašna proizvedenog u Jugoslaviji, *VII Simpozijum tehnologija stočne hrane "Unapređenje tehnologije proizvodnje stočne hrane"*, Zbornik radova, 200-210, Tara.
- Ristić M., Radenković B., Đorđević M. (2000): *Neškodljivo uklanjanje uginulih životinja i nejestivih sporednih proizvoda zaklanih životinja*, Triton Public, Beograd.
- Ristić M., Okanović Đ., Kormanjoš Š. (2008): Ispitivanje kvaliteta proteinskog brašna proizvedenog od sporednih proizvoda zaklane živine, *Tehnologija mesa*, **49(5-6)**: 243-248.

**PROIZVODNJA HRANE ZA ISHRANU PASA NA BAZI
PROTEINSKOG BRAŠNA DOBIJENOG PRERADOM
SPOREDNIH PROIZVODA KLANJA ŽIVINE**

- originalni naučni rad -

Slavko Filipović

Naučni institut za prehrambene tehnologije u Novom Sadu

Vera Radović

Agronomski fakultet, Čačak

Đorđe Okanović, Milan Ristić, Šandor Kormanjoš,

Naučni institut za prehrambene tehnologije u Novom Sadu

Vladimir Dasković

Agronomski fakultet, Čačak

Rezime

Proizvodnja hrane za kućne ljubimce je veoma zahtevan i kompleksan tehnološki postupak koji obuhvata tehnološke postupke mlevenja, mešanja, ekstrudiranja, sušenja, apliciranja tečnih komponenti (kao što su vitamini, aminokiseline, arome i boje), proces hlađenja, prosejavanja i pakovanja. Da bi se obezbedio visok nivo i kvalitet hrane za kućne ljubimce neophodno je obezbediti hraniva biljnog, animalnog i mineralnog porekla izuzetnog kvaliteta.

Za ispitivanja su korišćeni prateći proizvodi zaklanih tovnih pilića u odnosu koji se dobija kod klanja i primarne obrade trupova. Komponovana sirovina prerađena je po suvom šaržnom postupku sa odmašćivanjem pomoću prese.

Hrana za ishranu pasa na bazi proteinskog brašna dobijenog preradom sporednih proizvoda klanja živine prema propisima Evropske Unije je potpuno higijenski i nutritivno bezbedna za korišćenje u ishrani kućnih ljubimaca.