Nutritional Evaluation of Raw Materials Entering the Structure to Mixed Fodder for the Specie *Poecilia reticulata* (Guppy)

Adrian Gruber, Ioan Mircea Pop, Benone Păsărin, Aida Albu

„Ion Ionescu de la Brad" University of Agricultural Sciences and Veterinary Medicine Iaşi, M. Sadoveanu Alleys, no. 8, Iaşi, Roumania

Abstract

In the ornamental pisciculture is a especial emphasis on the exterior shape and color to the fishes, issues that are dependent directly to the structure of compound feeds in relation to the nutritional characteristics of the raw materials.Own research or focused on analyzing the crude chemical composition with Weende scheme (water content and dry matter, crude ash, crude protein, crude fat, crude fiber, SEN) of raw materials can be used in the structure of a compound feeds for the Poecilia reticulata (guppy) species, for most of these materials there are no current data in the literature.These materials were analyzed: gelatin, wheat flour, sunflower meal, soybean meal, meal *Spirulina platensis*, carrot (*Daucus carota*), *Pangasius* fillet, *Daphnia pulex*, grount dandelion (*Taraxacum officinale*), grount nettle (*Urtica dioica*) and yeast.

Keywords: chemical composition,fodder, *Poecilia reticulata*, raw materials, Weende scheme

1. Introduction

Poecilia reticulata is a species common in aquariums breeders in Romania but also from other European countries due to particular colors and shapes and, last but not least, that is easily maintained. To get healthy and viable specimens, has an important role the establishment of the fodder administered. In determining the diet should to keep in mind the chemical composition of food, but also the nutrient requirements for each species. Aquarium fish obtain most of their energy eating fat. To avoid disease to the liver, the fats should not exceed more than 15% of daily food [1]. Determination of gross chemical composition of the mixed fodder to be used for the fish Poecilia reticulata species is closely related to the chemical structure of raw materials incorporated therein. Therefore, this paper presents the results of the gross chemical composition for these raw materials: gelatin, wheat flour, sunflower meal, soybean meal, Spirulina platensis meal, carrot (Daucus carota) fresh Pangasius suitchi fillet, Daphnia pulex dry, dandelion (Taraxacum officinale) powder, nettle (Urtica dioica) powder and ground fresh yeast.

2. Materials and methods

The raw materials on which determinations were made on gross chemical composition have been mentioned in the introduction to the paper work. Determination of gross chemical composition was performed according to the scheme Weende (water content and dry matter, crude ash, crude protein, crude fat, crude fiber, SEN) [2].

Determination of moisture and the dry substance: It is calculated as a percentage of water lost by drying the sample to be analyzed. Then calculate the percentage of dry matter percentage of water decreased from 100% [3]. How was working according to ISO 6496: 1999 [4].

* Corresponding author: Gruber Adrian, 0748666482, adygruber@yahoo.com

Determination of crude fat. Samples with relatively high fat content (over 200g/kg) require a preliminary extraction with petroleum ether. For samples with a fat content as 200g/kg, the sample is hydrolyzed with hot hydrochloric acid. The solution is cooled and filtered. Wash and dry residue, then extracted with petroleum ether. The solvent is removed by distillation and drying. The residue is weighed. How was working according to ISO 5983: 1992 [5].

Determination of crude protein. Sample is decomposed at high temperature sulfuric acid in the presence of catalysts. Organic substances contained in the product analyzed by boiling with concentrated sulfuric acid, releasing their constituent elements decompose in various forms: C_2, CO_2, H_2, O_2, H_2O, phosphoric acid, ammonia. By treatment with concentrated sulfuric acid, organic nitrogen combinations (crude protein) in combination pass inorganic (ammonium sulfate). By determining the total amount of nitrogen in the sample we can estimate the appropriate amount of protein is unknown because the nitrogen content of protein, 16g nitrogen per 100g of protein, 6.25 g for 1 g protein nitrogen (100: 16 = 6. 25). Nitrogen composition of the chemicals in the bodies of many animals and plants: protein (N-protein), peptide (N-peptide), amino (N-amine), nucleic acids (nucleic-N, N-inorganic). All existing forms of nitrogen in a biological preparation or a food product are listed as total nitrogen. The term means both the crude protein substance protein nitrogen (crude protein or albumin) and nitrogenous substances (amides, salts, nitrogen, and urea). To determine crude protein using the Kjeldahl method [5]. How was working according to ISO 5983: 1992 [6].

Determination of crude fiber. To determine crude fiber method is used Henneberg - Stohman. All nutritional components of the sample, except pulp, are solubilised by boiling successively with sulfuric acid solution and sodium hydroxide. The residue is filtered, dried and weighed ash. How was working according to ISO 6865: 2000 [7].

Determination of crude ash. Gravimetric determination of ash is made. It shall keep under review an amount of 3-5g sample of analysis is subject to calcinations at 600 ° C. The ashes are expressed as a percentage of the weight of sample taken into work. How was working according to ISO 5985: 1978 [8].

Determination of SEN. These substances are determined solely by calculation formula: SEN(%) = SU (%) – (PB % + GB % + Cel.B % + Cen.B %) [2]

Where: SEN (%) – neazotate extractive substances; SU (%) – dry matter; PB % - crude protein; Cel.B % - crude fiber; Cen.B % - crude ash.

3. Results and discussion

Using the above methods work, the gross chemical composition was determined for raw materials which will form mixed fodder for the species Poecilia reticulata. Gross chemical composition of raw materials directly affects the structure and composition of mixed fodder.

Therefore to determine the proportion of all raw materials entering fodder to know addition of nutrients necessary for selected species and chemical composition of each component [9].

Table 1. Results on dry matter and moisture content of raw materials in the structure of combined fodder species *Poecilia reticulata*

Raw materials	Moisture (%)	Dry matter (%)
Gelatin	11,59	88,63
Wheat flour	6,65	93,35
Sunflower meal,	3,09	96,91
Soybean meal	11,37	88,63
Spirulina platensis meal	7,93	92,07
Carrot (*Daucus carota*) fresh	89,43	10,57
Pangasius suitchi (fillet) fresh	81,35	18,65
Daphnia pulex dry	11,25	88,75
Dandelion (*Taraxacum officinale*) powder	8,44	91,56
Nettle (*Urtica dioica*) powder	9,45	90,55
Ground fresh yeast	69,11	30,89

Knowing the water content of raw materials is of great importance because it is inversely proportional to the ratio of nutrients. The water content is more fodder preserved will be easier and will have a lower nutritional value.

Fresh raw material humidity varies between 89.43% - 81.35%, moisture largest having a fresh carrot, close to the value determined Pangasius suitchi fillet. For dry materials, the humidity varies between 3.09% and 11.59%, the maximum recorded for gelatin. The dry matter varies inversely with the humidity being higher in sunflower meal (96.91%) and reduced to carrots (10.57%).

Table 2. Results of the content on the organic dry substances of raw materials in the structure of combined fodder species *Poecilia reticulata*

Raw materials	Crude Protein (%)	Crude Fat (%)	Crude Fiber (%)	SEN (%)
Gelatin	87.32	-	-	0.59
Wheat flour	12.04	0.37	0.38	80.06
Sunflower meal,	20.90	16.10	27.05	28.05
Soybean meal	46.84	1.72	5.07	28.94
Spirulina platensis meal	57.97	1.33	0.32	24.49
Carrot (*Daucus carota*) fresh	0.99	0.13	0.94	8.02
Pangasius suitchi (fillet) fresh	13.06	1.15	-	3.54
Daphnia pulex dry	48.60	1.57	5.71	11.74
Dandelion (*Taraxacum officinale*) powder	13.47	2.15	16.82	38.64
Nettle (*Urtica dioica*) powder	20.49	1.73	8.87	33.10
Ground fresh yeast	16.39	0.52	0.22	11.92

Proteins of animal origin have a higher biological value compared to the plant, because it has a structure similar to the animal body [10].

Crude protein requirements for Poecilia reticulata is 30%, 6% crude fat and crude fiber 4% [11].

The table above shows that the limits of quantitative variation in the raw materials are organic matter within the literature data for the species Poecilia reticulata. The amount of crude fat varies between 0.37 to 2.15%, except sunflower meal containing 16.10% crude fat.

Cellulose is found in excess in sunflower meal (27.05%), followed closely by the amount of pulp from dandelion (16.82%). The minimum value for cellulose was determined for wheat flour (0.38%). Animal raw materials (gelatin, Pangasius suitchi fillet) do not contain cellulose. The maximum amount of SEN has been for wheat flour (80.06%), well above the value determined for gelatin(0.59%).

The highest values of the quantity of crude ash were recorded for nettle, dandelion and Daphnia pulex (26.36%, 21.13% and 20.48%). The carrot is the smallest quantity of ash (0.49%). All the ash forming minerals in feed raw. Ash content of raw materials allows us to use them to form a combined feed for the species Poecilia reticulata.

Table 3. Results of inorganic solids content in raw materials in the structure of combined fodder species Poecilia reticulata

Raw materials	Crude ash (%)
Gelatin	0.50
Wheat flour	0.50
Sunflower meal,	4.81
Soybean meal	6.06
Spirulina platensis meal	7.96
Carrot (Daucus carota) fresh	0.49
Pangasius suitchi (fillet) fresh	0.90
Daphnia pulex dry	21.13
Dandelion (Taraxacum officinale) powder	20.48
Nettle (Urtica dioica) powder	26.36
Ground fresh yeast	1.84

4. Conclusions

1 Raw materials to be nutritionally analyzed, containing all nutrients in sufficient quantities to form a combined feed for the species Poecilia reticulata;
2 Using raw materials of animal origin (gelatin, Pangasius suitchi fillet) in combination with vegetable (carrots, dandelion, nettle), ensures quality mixed fodder, providing all nutrients in optimal amounts;
3 To have healthy fish, attractive shapes and colors, provide fodder to digest and assimilate all the nutrients, thus ensuring its efficient use;
4 The raw materials are readily available and do not require expensive machining operations to form mixed fodder. This leads to lower manufacturing costs combined fodder, with direct implications on the final cost.

References

1. Bermann, J. C., Peşti de acvariu, Editura Lucman, Bucureşti, 2006
2. Halga, P., Alimentaţie animală, Editura Pim, Iaşi, 2002
3. SR ISO 6492/2001 – Nutreţuri. Determinarea conţinutului de grăsime;
4. SR ISO 6865/2002 – Nutreţuri. Determinarea conţinutului de fibră brută, metoda cu filtrare intermediară;
5. SR ISO 5984/1996 – Nutreţuri. Determinarea cenuşii brute;
6. Şara, A., Odagiu, A., Controlul calităţii nutreţurilor, Editura Academic Pres, Cluj-Napoca, 2005
7. Tacon Albert G. J., The nutrition and feeding of farmed fish and shrinp - a training manual food and agriculture organization of the united nations, Brazil, 1987
8. Oprea, M., Nutriţia şi alimentaţia peştilor, Editura Orizonturi Universitare, Bucureşti, 2000
9. Halga, P., Pop, M., Avarvarei, T., Popa, V., Nutriţie şi alimentaţie animală, Editura Alfa, Iaşi, 2005
10. SR ISO 6496/2001 – Nutreţuri. Determinarea conţinutului de umiditate şi de alte substanţe volatile;
11. SR ISO 13325/1995 – Nutreţuri. Determinarea conţinutului de azot şi calculul conţinutului de proteină brută;