THE INFLUENCE OF FEED ON THE QUALITY OF THE MEAT OF FARMED COMMON CARP *(CYPRINUS CARPIO L.)*

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Abstract

In aquaculture, the use of suitable diets for the fish species is fundamental to promote efficient and healthy growth. In the present context, the analysis of the chemical composition of diets becomes essential, especially when using locally sourced ingredients.

In the research we focused on the preparation of four fodder recipes intended for Common Carp (Cyprinus Carpio L), using only local ingredients to ensure solidity and convenience such as: wheat, corn and sunflower meal, in well-preserved quantities to satisfy nutritional value of the diets, which will mean an improvement in the growth performance of common Carp (Cyprinus Carpio L).

Therefore, the development of fodder diets suited to local conditions contributes to the promotion of an increase in the fishing industry.

Key words: *feed, carp, wheat, corn, chemical composition*

INTRODUCTION

Aquaculture is one of the agricultural sectors with rapid growth, the reason being that aquaculture represents a large source of quality food that helps to supplement it with nutrients for human consumption. Aquaculture is essential in meeting the global demand for food and nutrition, as it is the fastest growing sector within the food industry [1].

The chemical composition of fish meat is determined by many exogenous, physiological and endogenous factors, the endogenous ones include all metabolic processes, sexual maturity and genetic parameters, and the exogenous ones are composed of water quality, food quality and quantity, and the microclimate.

Food is the most important exogenous factor and influences both the chemical composition of fish meat and growth performance.

In Romania, since Common carp is an affordable fish food that constitutes about half of total production costs, it is essential to obtain feed components at minimal prices [2].

Feeds with high energy content support rapid growth and reduce production time, and those high in protein and fat stimulate fat accumulation and the protein content of fish meat remains constant [3].

In aquaculture, creating optimal feed diets for fish species is vital in order to promote healthy and efficient growth. In the current context research on the chemical composition becomes essential, especially when using local ingredients to maintain their accessibility and sustainability [4].

Adapting food to the specific nutritional needs of fish species and development stages helps to improve growth performance and reduce the impact on the environment, by using local ingredients and

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suitable production methods, aquaculture can play an important role in reducing the pressure on natural resources and food security [5, 11].

The investigations carried out have shown that they have a special contribution to the promotion of a responsible and sustainable growth of the fishing industry.

In the present study we focused on the composition of four feed recipes, using local ingredients such as wheat, corn and sunflower meal in very well defined quantities to satisfy the nutritional requirements of the fish species, in our case the common carp (*Cyprinus Carpio L*) [6, 7].

MATERIAL AND METHOD

In order to create experimental diets for farmed carp meat we used several varieties of wheat, in addition to the Glosa and Abund varieties, we also used two more unknown varieties, one purchased from a marked in the city of Iasi and one from the Research Station Development for Aquaculture and Aquatic Ecology, Iasi [8].

In the case of corn and sunflower meal, they were purchased for the needs of the Research Station Development for Aquaculture and Aquatic Ecology. The ingredients used were processed according to the processed of extrusion, grinding and mixing, and finally going through the pellet process [8].

Four recipes were made with 60% sunflower meal, 20% wheat and 20% corn, the factor that varied in these recipes was the variety of wheat. Feeding was done automatically three times a day [9].

The water started at a temperature of 25°C and decreased to 21°C by the levels of oxygen and monitored the temperature. The fish were relocated to the circulating aquaculture system at the station and acclimatized to the new surroundings prior to commencing the experiment.

The fish were placed into fifteen cylindrical tanks made of fiberglass, each having a capacity of 0.75 cubic meters. The recirculating aquaculture system includes fiberglass growth tanks, a pumping system for water circulation, and sensors for monitoring various physical and chemical parameters. A portable multiparameter device was utilized to measure temperature, dissolved oxygen, pH, and conductivity.

The analysis of the chemical composition was carried out with the help of the NIR DA 7250 Analyzer, determining the content of moisture, starch, proteins, fibers, fats, oil, ash and other constituents.

The purpose of the research was to create local fodder recipes in order to promote healthy growth as well as maintain sustainability and accessibility.

RESULTS

We can see some significant differences between the wheat varieties especially in terms of starch and protein content.

The varieties of wheat purchased from the market and by the Development Research Station for Aquaculture and Aquatic Ecology show some significant variations if we compare them with the two basic varieties used and this directly influences the results obtained when determining the nutritional value [10].

The subsequent findings related to the growth of carp were observed. The examination of growth performance and meat characteristics was conducted through statistical methods known as analysis of variance (ANOVA), followed by Tukey's post-hoc test ($p<0.05$) utilizing SPSS software version 21 from IBM Corp.

The outcomes are presented as averages along with the standard error of the mean. The chemical analysis were assessed using a two-way ANOVA approach, subsequently followed by Tukey's multiple comparison tests.

Differences were deemed significant when $p<0.05$, and the findings are expressed as means ± SEM.

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To evaluate the nutritional value of the feed mixtures, it is crucial to examine the chemical characteristics of their components. Table 1 displays the chemical profiles of the ingredients that are included in the feed blends.

Table 2 details the chemical composition obtained for the ingredients used in feed networks.

It can be seen that corn has a high content of starch and a moderate content of proteins, while sunflower meal has a high content of protein and fats and a low percentage of starch. Therefore, these obtained results mostly influence the nutritional value of the recipes

In table 3 we present the chemical composition of the recipes created using different varieties of wheat.

It can be seen that the variations in the chemical composition of the 4 feed recipes exist and have significant different values both in the case of protein, fat and fiber content and in the case of the other studies components.

Table 1. Chemical composition for wheat varieties used in feed formulation

%	Abund	Glosa	Market	SCDAEA
Protein	9.30	13.11	11,98	16.02
Moisture	14.50	8.01	13.53	11.97
Starch	71.20	72.30	73.96	66.87
NDF	17.90	16.52	18.60	20.91

Table 2 Chemical composition of other feedstuffs

Ingredients	Protein	Starch	Moisture	Fiber	Fat	Ash	Oil
Sunflower	42.96	-	11.02	19.50	1.20	8.02	-
Corn	8.20	64.11	11.99	-	-	-	2.95

Table 3 Diets chemical composition – nutritional value

%	Recipe 1 Abund	Recipe 2 Glosa	Recipe 3 Market	Recipe 4 SCDAEA
Protein	25.02	25.75	25.20	25.90
Moisture	12.10	11.80	12.20	11.20
Fat	3.60	2.90	2.75	2.65
Ash	12.31	8.70	10.03	10.97
Fiber	8.32	9.54	8.58	8.82
Starch	25.64	24.21	26.32	25.11
Sugar	2.69	2.87	2.86	2.51

The fodder obtained with the wheat variety purchased from SCDAEA stands out as having the highest protein content, something that correlates with the protein content of this variety.

The study carried out highlighted the impact that the wheat variety has on both the composition and the nutritional value of the forage diets intended for consumption for farmed common carp.

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In particular, it was observed that the use of a wheat variety with a high protein content such as the one purchased from SCDAEA had a positive influence on the amount of protein in the final recipe, but even when the proportions were similar to other recipes.

The observation made denotes the fact that an adequate selection of wheat varieties plays a very important role in improving the nutritional value of diets for common carp [12].

Even if the quantities of ingredients are similar, the differences in the chemical composition significantly affect and modify the nutrient content of the final feed.

Therefore, for the formulation and development of fodder diets, it is necessary to consider not only the quantities of ingredients, but also their quality and composition [13].

CONCLUSIONS

The study carried out highlights how necessary it is to choose local ingredients in the composition of the forage diets for carp feeding.

Their nutritional value is directly influenced by the multitude of ingredients and varieties of wheat.

In order to optimize these diets, more research is needed to ensure a balanced and adequate nutrition.

At the same time too high or too low levels of protein in the feed negatively influence the growth performance of the fish.

We can say that the chemical composition of the feed administered directly proportionally influences the composition of fish meat, so in the process of feeding fish, the percentage of protein increases and the amount of water in the meat decreases, which is a positive aspect.

It is also very important to know the nutritional preferences of each fish species and then to choose the breeding system, the daily ration and the right food.

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