Productional and Financial Differences between Carp Fingerling Fed with Extruded and Pelleted Feed

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Abstract

Research was made to solve the dilemma of the choice between two types of feed available in our market. The objective was to compare production results and financial feasibility of different preparation of fish feed. We followed growth and body FCR of juvenile common carp in first year of life- in three year system, fed with extruded feed and regular pelleted feed. All feed had the same level of proteins and protein to energy ratio. Experiment was established during four months in feeding season. 50.000 common carp fingerlings per lake (initial body weight was 0.9 g) were distributed into 5 earth ponds (area 2 ha each), and prepared equally for the experiment, until they average body weight reached 30 g. Two treatments that included two (extruded), and three (pelleted) repetitions were prepared for the experiment. Feed consumption was determined by average body mass, which were measured every 10 days. Percentage of mortality and health issues was not significant. Average body weight was around 95, with FCR about 2.5. Obtained production results indicate that feed manufactured in our facility generates same results as the extruded feed of renowned feed producer. Also we made a calculation of financial gain and made the conclusion of financial viability of each treatment.

Keywords: common carp, extruded fish feed, pelleted fish feed, production results

1. Introduction

In our country fish production has tripled in the last decade, but together with the amount of fish that was caught in rivers and lakes, less than 30% of fish meet needs are produced in Serbia, while the missing quantities of 70% are imported (sea and freshwater fish) [1]. The trend of increasing fish imports continued in 2017, so that fish and fish product were payeed more than $ 89,2 million. The countries from which are imported, fish and fish products are Thailand, Vietnam and Argentina. Export of fish has increased, and in 2017 it amounted to 15,4 million US dollars. The countries in which the fish are exported are Macedonia, Bosnia and Herzegovina, Croatia, Montenegro, Italy and the Netherlands [2].

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Changes in the market are influenced by several factors, from different spheres of life. One of the essentials is to increase people's awareness of a healthy diet that is due to a high percentage of patients with cardiovascular diseases (atherosclerosis, myocardial infarction, cerebrovascular stroke, lung embolism), as well as an increase in the percentage of obesity [3]. Fish, and thus carp that belongs to white fish, contains high-quality proteins, which are essential for normal growth and development, while on the other hand they contain fat that is largely unsaturated.

The second reason is that the total quantity of fish is reduced in natural waters, due to global changes and long-term maximum catch. Because of this, a simple proportion of the need for raised fish is increasing.

The reason is also that due to the global financial collapse of the consumer society, the purchasing power of the average consumer has declined, and for this reason there is a growing demand for

cheaper sources of quality proteins. According to the RZS in the period from June 1, 2017, the price of carp in ranged from 310.00 to 600.00 RSD. The price of chicken meat (with bones) was 200,00 to 300,00 and it was the only meat that had a lower price than carp, while beef (460,00-820,00 RSD), pork (420,00-505,00 RSD), and other types of meat are significantly more expensive [4].

In addition to favorable market conditions, the associated sociological and medical importance of increasing production, there is also the fact that in addition to the existing hot water ponds, which are estimated at 11,000-13,000 ha [5], although only in Banat, there is a land of 100,000 ha that is weaker bonitas, and the biggest gain would be to manage the production of hot water fish.

Certainly, one of the most influential factors in fishery production is diet, which makes up to 70% of costs [6]. Therefore, any improvement in nutrition indirectly provides a condition for reducing the prices of basic foods that is, increasing the profits of the producers.

Changes in nutrition were gradual, from the original sporadic cereal conservation to the present fully balanced pellets, which are the first requirement of intensive production. For the preparation of these pellets, in practice, two technological processes, self-pelleting and some newer extrusion are present. Their advantages and disadvantages are compared several times, but most often for the examination of other fish species whose needs are different from the need of carp.

2. Materials and methods

The experiment included 5 separate soil structures with the surface of 2 ha, the depth of 1.2-1.5 m. In each of the objects had been imputed a 50,000 larvae of the same age and the same average size 0.9 g. The fry was measured in a sample of 50 pieces, every 10 days. The experiment lasted 62 days, with a preparatory period of 32 days. The fry produced a three-year plan for the system of production.

In this experiment the effect of using classical, pelleted feed and extruded feed on carp fingerling production parameters. The level of protein and energy is equal in both compositions (±1%). The percentage is 5% of the total weight of the fish, as hafted with a smaller number of larvae, so it is sufficient amount of natural foods.

The effect of different techniques of processing food for carp fingerling in this study was determined based on the following parameters: Daily and overall growth of the fingerlings, Food consumption, Mortality, The health status of fingerlings, Economic effect calculation.

Preparation of the pond meant drying, and mechanical processing by plating to a depth of 10 cm. After that, 8,000 kg/ha of mature beef manure and 750 kg / ha of lime were razed to the surface of the pond. In addition to this primary, the crop was done during the production of the fingerling, every month with 100 kg/ha of lime.

Water is provided from the first layer of groundwater that is pumped into the preparatory channel, where degassation and oxygenation of water is carried out, as well as the equilibrium of the temperature [6]. The channel is 2,200 meters long, 10 meters wide, circular. Ponds, each for themselves, are supplied from the channel, again with the pumps. Water has been imputed on June 20, three days before the planned planting, to allow the development of plankton, which is the first food to fish larvae, to avoid algae growth, and multiplying insects in the water.

The facilities were planted on June 23. With 50,000 pieces of average weight of 0.9 g and 36 days of age.

Before joining the experiment all fingerling are fed equally. By the 32 day of age, the diet of larvae was based on live natural foods and pre-amber by the composition.

Pelleted feed was produced in the holding region according to the recipe from the pond holder, and it was made from soya 50%, corn 38%, barley 10%, premix 11% Minazel 0.5%. Extruded feed was purchased from the manufacturer "DTD Ribarstvo".

The amount of food given to the carp was determined by the average body weight at the control measurement for the period until the next measurement (10 days). The percentage is 5% of the total weight of the fish, because it was planted with a small number of larvae, and there was a sufficient amount of natural food.

The conversion is grossly calculated, the reason is the inability to accurately monitor the death and spread of food, and their value is included in the solution as an error. The control of the state of health and the occurrence of the disease was

carried out daily; while on the second and third trial on the example were clinically and patomorphologically examined [7].

3. Results and discussion

The success of the production of juvenile carp varies from several independent factors, so investigating the impact of different ways of food preparation, tends to remain the conditions are absolutely identical in all facilities. For this reason, the parameters of water quality in the ponds were controlled and satisfying in all ponds. In Table 1 and 2, parameters of water quality were given. Physical parameters were measured in all ponds separately and second table results are from collective channel. The percentage of proteins was not according to the recommendations for this age category listed in the literature review, because pelleted foods produced using the farmhouse recipe were used. And extruded food with a percentage of proteins of 25% was selected as pandane to pelleted feed because this eliminated the effect of protein level on the increase. The chemical composition of both mixtures is given in Tables 3 and 4.

Table 1. Physical Water Quality

	Water temperature	Air temperature	pH
Maximum values	30˚C	44˚C	8.9
Average value	----	-----	7.8
Minimum values	21˚C	6˚C	7

Table 2. Chemical Water Quality

		M
Soluble oxygen	5.74	mg/l
Ammonia salts	0.37	mg/l
Free ammonia	0.009	mg/l
Electrical conductivity	1343	μScm^{-}
TDK (amount of salt)	673	mg/l
Consumption KMnO4	38	mg/l
Alkalinity p	0.0	m val
Alkalinity m	10.1	m val
Carbon dioxide	6.6	mg/l
Carbonate	0.0	mg/l
Hydrocarbonate	620	mg/l
pH	8.0	
Phosphorus	0.23	mg/l
Oxygen Saturation	59	%

Table 3. Chemical composition of Peletted feed

Peleted	ND	DM	M
DM	93.96	100	%
Water	6.04		%
C.Protein	24.24	25.8	%
C.Fat	7.96	8.47	%
C.Fiber	2.95	3.14	%
Ashes	11.92	12.69	%
BEM	46.89	49.90	%
Ca	3.17	3.37	%
P	1.95	2.08	%
Na	0.19	0.20	%

Table 4. Chemical composition of Extruded feed

Extruded	ND	DM	M
DM	91.11	100	%
Water	8.89	-	%
C.Protein	25.1	27.55	%
C.Fat	7.21	7.9	%
C.Fiber	4.1	4.5	%
Ashes	6.21	6.81	%
BEM	52.91	58.0	%
Ca	0.8	0.87	%
P	0.6	0.66	%
Na	0.2	0.21	%

For ease of consideration, the movement of average body weight and daily weight gain are shown in Figures 1 and 2. Treatment of test parameters did not show a statistically significant difference between the groups that have been given feed processed, pelleting, and processed by extrusion, as viewed in a two-week interval, nor in the whole experiment. Unquestionably, a positive influence on the yield in the extrusion consumable fattening carp, according to the results of Cho (1990), Akiyama (1999) and Stanković et al. (2011) [8-10]; but it must be stressed that there are differences when it comes to carp fingerlings. According to Dulic et al. (2010) [11], the abundance of phytoplankton and zooplankton in fish pond water, it is stated that the pools where used pelleted feed plankton considerably more numerous than the pond in which we used extruded feed, due to the faster dissolution of pellets in contact with water. Phytoplankton is several times more numerous than zooplankton, and may come to the conclusion that the paucity of zooplankton only apparent, because the carp fingerlings used as natural food. These and growth, which reached fingerling in ponds with pelleted feed, partly attributable to the production of zooplankton.

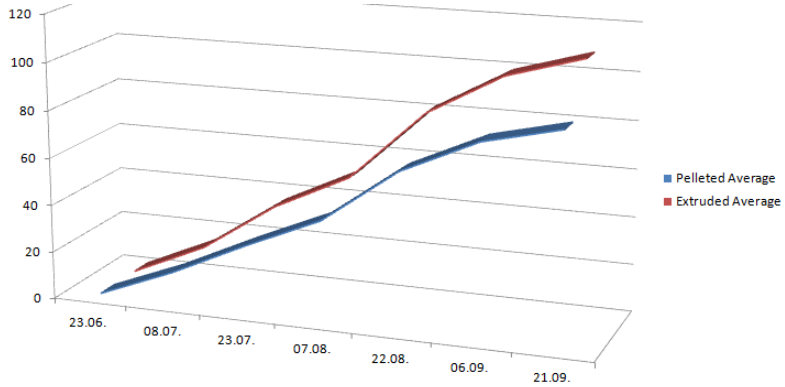

Figure 1 Averages of mass in two treatments

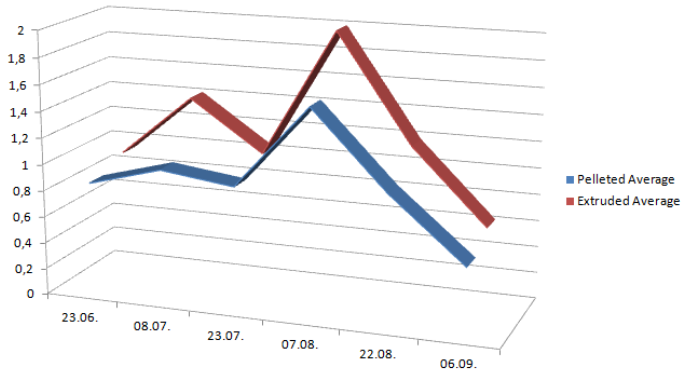

Figure 2. Averages of daily gain in two treatments

The difference in the prices of these two types of food is shown in Table 5. For the price of extruded food, its market price is taken, and the price of pelleted food is the calculated cost price. From the data, the financial benefit of the use of pelleted foods in the production of fingerling.

Table 5. Financial calculation of the experiment (RSD/kg)

Cost	Peleted feed	Extruded feed
Material costs	-	82
Repro material	38	-
Electricity	3	-
Other material costs (5%)	2	-
Immaterial costs		-
Amortisation	1.5	-
Manpower	0.5	-
Other non-material costs (2%)	0.05	-
Total	45.05	82

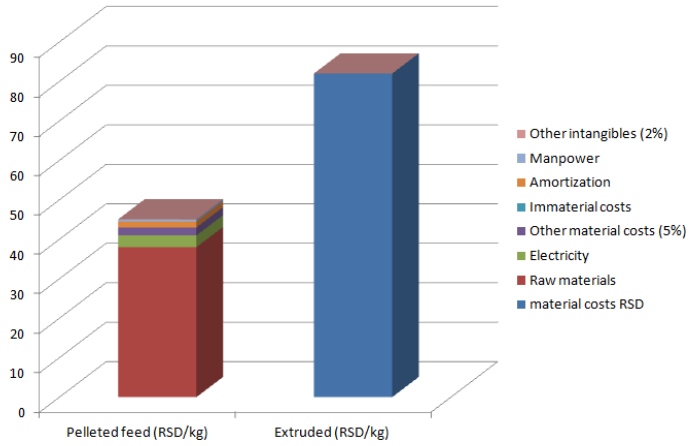

Figure 3. Financial benefits of pelleted feed

In Table 6 we presented the helt issued results of our research. Helt was very well preserved in experimental period, with small infestations with parasites, viruses and bakteria.

Table 6. Health control results

No.	Date	Cause of illnes	No.
Pond 1.	8.7.	Lernea	1
	7.8.	Botriocephalosa	1(5 rep*)
	22.8.	Lernea	5
		Inflamation of the air bladder	1
Pond 2	8.7.	Lernea	1
	7.8.	Inflamation of the air bladder	1
	22.8.	Lernea	4
Pond 3	7.8.	Inflamation of the air bladder	3
	22.8.	Lernea	1
		Botriocephalosa	1 (3 rep)
Pond 4	7.8.	Inflamation of the air bladder	1
	22.8.	Lernea	4
		Botriocephalosa	2(3 rep)
Pond 5	7.8.	Botriocephalosa	1(1 rep)
	22.8.	Lernea	4
Pond 6	7.8.	Gill deformation	3
	22.8.	Gill Necrosis	1

4. Conclusions

- the positive influence of the use of extruded food to increase carp, when viewed from the entire period that is analyzed. But when we analyze just first year of production, a significant difference between the fingerlings fed with extruded, and those fed with pelleted feed has not been established.
- when comparing the total mass after treatment, a statistically significant average values are lost. It is concluded that the variation in the weight of individuals affected by a set of external factors not covered by the experiment.
- mortality and illness in both treatments was minimal. Diseases have occurred sporadically.
- price of pellets which were used in the first treatment, lower by 50% of the extruded food (treatment 2), and financially justify the use of food pellets in the production of carp fingerlings.

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