Geese Raising on Fish Ponds

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Introduction

Poultry production is mostly limited to chicken and turkeys where the technological process is profitable due to the short duration cycle, low-cost of day old chicks, small food conversion and wide availability of meat for consumption at a lower cost. In contrast, goose meat achieves a higher price as goose production is more demanding. Intensive fattening of geese on deep litter is related to a number of negative side effects. A large amount of bedding material is produced, and manure removal and disposal is an additional, unnecessary expense. Disposal of bedding material also pollutes the environment. Manure removal requires disinfection of the breeding area which together with the disposal of bedding, represents a burden on the ecosystem. In this regard, integrated farming alongside aquaculture is environmentally acceptable (Chan, 1993). There is a significant financial loss on the disintegration of feed. Namely, geese take feed in a way that creates dispersal that ends up in bedding material and is irreversibly lost. Moreover, geese droppings are perfect base for zooplankton and phytoplankton development, which serves as fish feed (Colman and Edwards, 1987). This is based on the specific physiology of water birds (Bilo, 1983). Le Hong (1992) used integrated breeding of duck and fish, where ducks were fed in a confined area where feed dispersal did not fall into the pond. Cruz and Shehadeh (1980), Delmendo (1980), Esteky et al. (1995) and Soliman et al. (2000) proposed a similar method of integrated husbandry. Following a successful study on duck raising at fish ponds (Stojević et al., 2003), we wanted to explore the symbiotic relationship of geese and fish.

Materials and Methods

This study was carried out on the indigenous goose breed "Pakračka goose" (Croatia) and at an annual plantation of one-year old carp; initial weight about 100 grams.

Technology Description

One-day old goslings were received in a room heated to 30 °C. Reception of goslings was performed in enclosures of 1.5 m^2 ("circles") with cardboard (Fig. 1). Each circle contained 65 goslings. The cardboard background was changed daily. After three days, the barrier between circles was removed and goslings were released into a space room with bedding material of wood shavings. Upon receipt, goslings were offered drinking water with 0.5% glucose and 1 g/L vitamin C. In the first 8 hours after receipt, goslings were denied feed in order to completely resorb yolk sac. After this period, goslings were offered feed (pellets, starter with 22% protein) and drinking water (addition of 2 g/L Muvisel®; vitamin formulation - PLIVA Zagreb). The supplement Muvisel® was administered for three days, and after

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that, goslings were only given clean water. Room temperature was reduced daily by 0.5 °C. At the end of third week, warm breeding was finished. During the next two weeks, the goslings were discharged to an outdoor enclosure during pleasant weather conditions (Fig. 2). Afterwards, animals were given the mixture for growing chicks. At the beginning of a sixth week, they were released to the fish pond and fed the final forage for chicks. The mixture was gradually replaced by ground corn with the abundant addition of grass mass. Feed containers for goslings were placed on pontoons (wooden posts driven into the bottom of the pond). The feed container is characterized with dry access comprised of boards that allows geese to come out of the water to feed. The feed also has an improvised wooden bridge that allows employees easy access for feed transport (Fig. 3). Feed container size, primarily the dry access surface, was determined by the number of geese. Since geese do not all feed at the same time, in this study, the length of dry access from both sides of feed containers was 1 m for 50 geese, which proved sufficient. The experimental area consisted of a fish pond measuring 80 x 110 m, 2 m depth and terrestrial, dry confined area measuring 20 x 80 m. In the dry part of the enclosure, there was an improvised canopy where the geese could seek shelter from inclement weather. Prior to the receipt of goslings in enclosure, the fish pond was planted with one-year old common carp (*Cyprinus carpio*) weighing about 100 grams, with a planting density of 10,000 individuals; white and silver carp (*Hypophthalmichthys molitrikx*) whose numbers were based on weight in relation to the carp hatchlings and was 20% of the carp weight. The water level in the fish pond was constant and was kept by constant flow of fresh water through the flood barrier. On a pond prepared in the described manner, 394 geese were discharged (400 geese entered the enclosure, 6 perished during the warm breeding period). According to research conducted on ducks, the number of geese in similar conditions could possibly be higher. However, due to the consumption of large amounts of grass we assumed that the organic loading of fish ponds could be much higher than in the fattening of ducks on the fish ponds. The production cycle was carried out on one geese flock, from April to mid-September. During the production cycle, fish were not fed, but their growth was entirely dependent on the symbiotic relationship of geese and fish.

Results and Discussion

During the described technological process, we wanted to explore the possibilities, results and cost-effectiveness of goose fattening on fish ponds. The idea was designed after the model of duck fattening on fish ponds (Stojević et al., 2003). Although the breeding process appears similar, goose fattening is completely different from that in ducks. Duck fattening lasts 7 weeks and alternates cyclically on the pond every 4 weeks (after the warm breeding period). Goose fattening is performed in one cycle as described in the technological process here. Furthermore, geese eat grass mixtures, unlike ducks, which markedly increases the organic loading of fish ponds from drop-

Fig. 1. Reception of goslings

Fig. 2. Discharging of goslings in an enclosure

Fig. 3. Feed container

Fig. 4. Destroyed mound on fish pond (marked in a red circle)

pings. Previous studies have suggested that a more cautious approach should be taken with regard to geese number and fish plantation. The results in this study undoubtedly show that goose fattening on fish ponds is an extremely economically and environmentally justified technology. The final weight of geese at the end of the fattening period amounted to an average of 5.37 kg, with a mortality of 1.5%. This mortality referred to the warm breeding period, which is not attributed to production technology but rather due to weak individuals and errors in transport of one-day old goslings. The food conversion in this experiment was extremely high (5.5 kg of weight gain) and considered the time spent on the fishing ponds. This high food conversion is a consequence of not using protective nets over the rearing area. The feed containers on the fish pond were also abundantly used by wild birds, who cohabited the area with the geese and fed on the goose feed. Due to the time spent on the water, the geese had extremely dense and clean feathers. Goose down and feathers haver significant applications in the textile industry, which should be considered as an economically extremely important product. Four weeks after geese were excluded and sent to slaughter, experimental fishing of carp was carried out. Results of weighing the two-year old juvenile fish showed an average weight of 250 grams, with no extra feed. In conclusion, this study shows that there is justification of integrated production in aquaculture for geese and fish. The weight gain of both geese and fish was satisfactory. Goose mortality on fish ponds was not recorded, but only in the initial warm breeding phase (1.5%), which can be considered economically negligible. There were several disadvantages in the technological process, which further justifies this studies. In fact, it would be mandatory to use protective nets over the fish ponds and confined area in order to prevent access of wild birds to fish, and also to reduce the high feed consumption (5.5 unjustified conversion). Furthermore, it was noticed that geese incurred significant damages to the pond banks. The geese's natural way of eating and anatomically adapted beak makes them to willingly root up the humid ground in searching of worms. This natural instinct should be suppressed by a network setup on the pond banks. This is corroborated by the fact that the geese in this study destroyed ("ate") a mound of a width of 1.8 meters during one production cycle (Fig. 4). In addition, it would be necessary to investigate a larger number of geese on fish pond with denser carp and silver carp plantation, which would prevent excessive development of algae and micro-organisms in general.

Summary

We studied the mutual benefit of geese and fish raising in a common habitat, a fish pond. Birds living in or very near water in aquatic or wetland habitats, live in a symbiotic relationship with the fish, whereby a cycle is closed when the bird droppings enhance the development of zooplankton and phytoplankton, which provides the basis for fish nutrition. Also, in the floor keeping of geese feed is lost in bedding material, but in this system, feed

in the pond falls into the water and serves as fish feed. The floor keeping of animals burdens the manufacturer with a large production of bedding material, resulting in higher costs of the technological process for manure removal and disinfection. In addition to cost, bedding material and disinfection pollute the environment; such pollution is completely negligible in the technological process in this study. This paper describes the technology of raising geese on fish ponds. The results showed that gosling mortality was negligible, only 1.5% in the initial warm breeding phase. The final weight of geese was on average 5.37 kg of body mass. Upon reception, the one-year old carp weighed 100 g and during the production cycle, their mass increased to 250 g without additional feeding.

Key words: *Goose, Fish, Fish ponds*

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References

1. BILO, D. (1983): Bewegung-Lauten Schwimmen, Fligen, In: MEHNER. A, W. HARTFIELD: Handbuch der Geflügelphysiologie Teil 1,1 Auflage. VEB Gustav Fisher Verlang, Jena.
2. CHAN, G. L. (1993): Aquaculture, ecological engineering: lessons from China. Ambio 22, 491-494.
3. COLMAN, J. and P. EDWARDS (1987): Feeding Pathways and Environmental Constraints in waste-Fed Aquaculture: Balance and Optimization. Detritus and microbial ecology in aquaculture, ICLARM Conference Proceedings 14, International Center for Living Aquatic Resources Management Manila, Philippines, (240-281).
4. CRUZ, E. M. and Z. H. SHEHADEH (1980): Preliminary results of integrated pig and duck-fish production tests. Integrated agriculture-aquaculture farming systems. Proceedings of the ICLARM-SEARCA Conference on Integrated Agriculture-Aquaculture Farming System, Manila Philippines, (225-238).
5. DELMENDO, M. N. (1980): A Review of integrated Livestock-Fowl Farming System in Integrated Agriculture-Aquaculture Farming System. Proceedings of the ICLARM-SEARCA Conference on Integrated Agriculture-Aquaculture Farming System, Manila, Philippines, (59-70).
6. ESTEKY, A. A., J. OLAH, S. A. NEZAMI and F. PEKAR (1995): The effect of high stocking density of fish and duck on pond community structure. Aquaculture 129, 391-392.
7. Le HONG, M. (1992): Duck-fish integration in Vietnam [http://www.fao.org/DOCREP/004/AC155E15.htm].
8. SOLIMAN, A. K., A. A. A. El-HORBEETY, M. A. R. ESSA, M. A. KOSBA and I. A. KARIONY (2000): Effects of introducing ducks into fish ponds on water quality, natural productivity and fish production together with the economic evaluation of the integrated and non-integrated systems. Aquacul. Intern. 8, 315-326.
9. STOJEVIĆ, Z., Z. PETRINEC, S. MILINKOVĆ-TUR, M. ZDELAR-TUK, J. PIRŠLJIN, B. BEER-LJUBIĆ, B. ŽUPAN, Z. BOŠNJAK (2003): Ducks breeding on fish ponds. Symposium Proceeding Peradarski dani Poreč, Republic of Croatia 14-17 May, (90-92).

Tov gusaka na ribnjacima

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U ovom istraživanju proučili smo međusobne koristi uzgoja gusaka i riba na zajedničkom staništu; ribnjaku. Poznato je da ptice koje obitavaju na vodi žive u simbiozi s ribama, čime je stvoren zatvoreni ciklus u kojemu ptičji izmet pospješuje razvoj zoo- i fito planktona te na taj način osigurava osnovu prehrane riba. Rasap hrane u podnom držanju gusaka, koji se gubi u stelji, hranidbom na ribnjaku pada u vodu i služi kao hrana ribama. Podno držanje gusaka opterećuje uzgajivača s velikom količinom stelje što rezultira povećanim troškovima izgnojavanja i dezinfekcije. Osim troškova, stelja i dezinfekcija zagađuju okoliš, što je u ovakvom načinu držanja u potpunosti zanemarivo. U radu je opisan tehnološki uzgoja gusaka na ribnjacima. Tehnološki proces sadrži opise toplog uzgoja, pripreme guščića za ispust, naseljavanje na ribnjak, prehrane tijekom proizvodnog ciklusa te nasada riba po hektaru proizvodnog prostora. Rezultati pokusa pokazali su kako je mortalitet guščića zanemariv, samo 1,5% u prvoj fazi toplog uzgoja. Završne težine gusaka u prosjeku su bile 5,37 kg. Šaranska mlađ zaprimljena u težini od 100 grama narasla je tijekom proizvodnog ciklusa na težinu od 250 grama bez dodatne hranidbe.

Ključne riječi: *guska, riba, tov gusaka na ribnjaku*