

FEEDING STURGEON WHILE CULTIVATION IN POOLS Sagidoldina Zh.¹, Rysbekova A.²

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Abstract: the article analyzes irrational use of biological resources of the Caspian Sea, poaching led to the fact that the number of sturgeon has dropped to a critical level. In this situation, it is important the development of commercial sturgeon breeding, which includes the restoration of commercial sturgeon stocks due to the introduction in the hatcheries Republic of Kazakhstan breeding and cultivation technology of sturgeon, as well as the formation of their broodstock. Basin method - the cultivation and maintenance of larvae, fry and fingerlings of sturgeon fish in hatchery trays and basins of water using gravity or motorized water pumps. Necessarily it is necessary to arrange additional lighting: on each pool at a height of 2-3 meters are installed two fluorescent lamps of 60 watts.

Keywords: Sterlet *Acipenser ruthenus* L., juveniles, fingerlings, two-year individual, survival, pools, ponds, repair herd.

КОРМЛЕНИЕ ОСЕТРОВЫХ РЫБ ПРИ ВЫРАЩИВАНИИ В БАССЕЙНАХ Сагидолдина Ж. Е.¹, Рысбекова А. М.²

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Аннотация: в статье анализируется, что нерациональное использование биологических ресурсов Каспийского моря браконьерский лов привели к тому, что численность осетровых снизилась до критического уровня. В сложившейся ситуации важным является развитие товарного осетроводства, которое включает в себя восстановление промысловых запасов осетровых рыб за счет внедрения на рыбоводных предприятиях РК технологий разведения и выращивания осетровых, а также формирования их ремонтно-маточных стад. Бассейновый метод – выращивание и содержание личинок, молоди и сеголеток осетровых рыб в рыбоводных лотках и бассейнах с использованием самотечного водоснабжения либо с механической подачей воды насосами. Обязательно необходимо организовать дополнительное освещение: над каждым бассейном на высоте 2-3 м устанавливаются две лампы дневного света мощностью 60 Вт.

Ключевые слова: стерлядь *Acipenser ruthenus* L. молодь, сеголетки, двухлетки, выживаемость, бассейны, пруды, ремонтное стадо.

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Pool method is the cultivation and maintenance of fish larvae, juveniles and fingerlings of sturgeon fish in hatchery trays and basins of water using gravity or motorized water pumps. It is necessary to arrange additional lighting: on each pool at a height of 2-3 meters should be installed two fluorescent lamps of 60 watts [1].

Start of feeding is determined by the release of the pigment plug in 30-40% of individuals. Outwardly, this stage is characterized by the discontinuance of excavating and the larvae rise to the stream. Since the transition to the stage of mixed feeding larvae feeding is carried out naturally by living organisms in conjunction with pasty or granular compound feed. At this time, activity of nutrition and the search reflex of larvae are small, so the ingestion of food is performed in the immediate vicinity, herewith larvae use their visual organ [5].

Feeding of the juveniles up to a weight of 3 g at the pool cultivation is carried out by primary forage. We recommend using dust-like fractions of artificial feed immediately in the transition to active feeding with a gradual increase in their share in the total diet. The first week of cultivation larvae up to 75-100 mg the proportion of artificial feed in the total diet should be 70-80%, in a subsequent (up to the weight of 1.5-2.5 g and age 40-45 days) - not less than 90-95% of [7].

Daily feeding rate with the combined feeds expected on 5-10 days (depending on the age of the fish) with considering of the water temperature, the average weight and its number of juveniles. The optimal frequency of feeding is connected inversely to the size of cultivating fish. Fish should be fed continuously, without spending considerable effort to search and ingestion, therefore intermittent feeding is used in the practice of fish culture as often as possible, which is particularly important at the beginning of the active nutrition. Automatic feeders are necessary for feeding of juvenile sturgeon, because the frequency of feeding larval sturgeon up to 48 times per

day. The frequency of feeding of fry and fingerlings of sturgeon is 8 to 12 times a day, yearlings and two-year individuals - from 4 to 8 times a day (Table 1).

Table 1. Frequency of feeding juvenile sturgeon fishes

Weight, g	Hand feeding	Feeding by automatic feeders
Up to 0,06	24	48
0,06-0,3	12	36
0,3-1,0	12	24
1,1-3,0	10	14
3,0-5,0	10	14
5,0-25,0	10-8	14-12
25,0-50,0	8	12
50,0-100,0	8	12
100,0-500,0	6-5	12
500,0-1500,0	5-4	12

With the use of automatic feeders the frequency of feeding the fish weighing from 50 to 500 g should be increased to 12 times a day [6].

If the temperature in the pool is stable and keeps the range of 17-19 °C during cultivation of young sturgeon, it is recommended not to reduce the multiplicity of feeding the fish and leave around 10 times per day for fish weighing from 25 to 150. Research of the Aquaculture Research laboratory of LLP "Kazakh Research Institute of Fisheries economy" has shown that a reduction in the multiplicity of feeding at a given temperature has a negative impact on the state of the fish. The long interval between feeds leaves fish hungry. However, during the cultivation of fish in mixed water, where there is the fact of raising the temperature multiplicity of feeding should be reduced in accordance with Table 1.

Efficiency of feeding depends not only on multiplicity feeding, but also the correct calculation of the daily diet, but in the case of using dry granulated feed it depends on timely transition to the large grain from the smaller one. Grain size should match the size of cultivated fish.

Noncompliance of this requirement results in the loss of food, pollution of nursery containers and reduction of the cultivation efficiency. During the transition to a larger fraction it is recommended to mix it with the grain of previous size [2].

During the cultivation according to larvae growth following sizes of groats are used (Table 2).

Table 2. Grain size depending on the weight of larvae and juveniles

Weight of larvae and juveniles, mg	Size of grain, mm
20-100	0,2-0,4
100-300	0,4-0,6
300-1000	0,6-1,0
1000-2000	1,0-1,5
2000-3000	1,5-2,5
Weight of grown juveniles, g	Size of grain, mm
3-10	1,5-2,5
10-20	3,0-3,5
30-50	3,5-4,5
50-250	6,0-8,0
250-500	6,0-8,0
500-1500	6,0-8,0

Daily feeding rate should be reduced to the extent of juvenile growth. Calculation of the ration is carried out according to the formula:

$$C = A \times P \times n / 100, \text{ where}$$

C - the daily feed ration,

P - the average weight of the fish,

A - the daily rate, % from weight of fish,

n - the amount of fish in the pool, pcs.

The daily feeding rate of juvenile sturgeon fish is shown in Table 3.

Table 3. The daily feeding rate of young sturgeon fish according to the temperature and weight

Weight , g	Daily rate, % from weight of fish			
	12 – 17°C	17 – 20°C	20 – 24°C	24 – 27°C
Up to 0,06	30	35	35	30
0,06 – 0,3	25	30	30	20
0,3 – 0,5	15	20	25	15
0,5 – 1,5	12	10	15	10
1,5 – 3,0	10	8	12	8
3,0 – 50,0	10 - 8	5 - 10	8 - 10	6 - 7
50,0 – 100,0	4	4 - 5	5	3 - 4
100,0 – 150,0	4	5-4	5	3-4
150,0 – 200,0	3	5-4	5	3-4
200,0 – 250,0	3	4-3	4	3-2
150,0 – 300,0	3	4-3	4	3-2
350,0 – 400,0	2	4-3	4	3-2
450,0 – 500,0	2	3	4	3-2
500,0 – 800,0	1,5	2	3	1
800,0 – 1000,0	1,5	2	3	1
1000,0 – 1200,0	1,5	2	3	1
1200, 0 – 1500,0	1,5	2	3	1

For more efficient use of feed the daily ration must be adjusted at first every 3 days, while for older juveniles at a weight of 2 g more than once in 10 days.

It is also necessary to correct the magnitude of daily rations and the mode of feeding due to changes in abiotic conditions in fish tanks, especially when the temperature rises beyond the optimal values. During the warming of the water to 25-26 °C daily feeding rate should be reduced to 30%, to 28 °C – to 50%, above 29 °C - reduce to 70% from the recommended value. Full feeding from 12 to 15 hours is skipped. Food is set 2-3 times during daylight hours with oxygen content in the water is not less than 6 mg / L. The presence of small forms of zooplankton coming with water improves the growth rate of larvae and reduces the cost of feed until 30%, particularly in the initial stages of cultivation [3].

Throughout the whole period of cultivation it is needed to include living feed in the diet. Before larvae reach the weight of 60 mg they are given Artemia salina, rotifers or small daphnia. Starting from the mass of 60 mg and above, as a living feed are used large daphnia and oligochaetes. The addition of living feed is performed in accordance with Table 4.

Table 4. The daily rate of adding the living feed additives at 10-27°C

Weight, mg	Daily rate, % from weight of fish
Up to 60	50 (small daphnia) or 35 (Artemia salina)
60-300	35 (¹ / ₂ daphnia; ¹ / ₂ oligochaetes)
300-500	25 (¹ / ₄ daphnia; ¹ / ₂ oligochaetes; ¹ / ₄ Californian worm)
500-1500	20 (¹ / ₂ oligochaetes; ¹ / ₂ Californian worm)
1500-2000	15 (¹ / ₂ daphnia; ¹ / ₂ Californian worm)
2000-5000	20 (daphnia)
5000-50000	10 (daphnia)

Conclusions

Experimental researches of aquaculture laboratory show that even when the juvenile individuals reach an average of 5-50 g sample, the presence of living feed in their diet is a prerequisite for their positive development - for the growth and the normal life of the fish. With the addition of living feed in the diet of larvae and juveniles the artificial food is better absorbed, since the natural feed is characterized by a complete biochemical composition, content of essential amino acids, unsaturated fatty acids, microelements and vitamins.

Before each feeding all uneaten feed and fish excrement are being removed from the pool. At night time when feeding is not carried out fluorescent lamps must be switched off to reduce the searching effect of fish. If the lamp stay switched on while feed is not being given, the fish will swallow air bubbles and as a result air-bubble disease can occur [4].

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