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Variability of Biological Traits and Fish Capacity Groups of Three Years Old Russian Sturgeons Hatched in Ponds

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Abstract: The sturgeon fish (namely the sturgeon species Acipenser) have an important commercial value, it was originally called as red fish for its especial value. The studies targeted changes in the values of length and mass as well as production potential of various size and weight groups of Russian sturgeon 3 year olds when hatching them in the ponds of carp fish farms in a polyculture with herbivorous fish. The main results of researches, it is possible to note that the highest fish capacity when hatching in ponds is observed at 3 year of age Russian sturgeon in big size and weight group. The highest values of absolute and average daily gain during hatching in ponds are observed in 3 year of age Russian sturgeon of big size and weight group. When hatching the middle and small size and weight groups of 3 year of age the absolute and average daily gain are mainly determined by the original level of ponds' fish capacity for Russian sturgeon.

Key words: Sturgeon fish, potential, weight, production, length

INTRODUCTION

The whole world is currently facing two acute problems, lack of food on the one hand and extermination of the animal and vegetable world in its natural environment, reduction of biodiversity. This way or another both problems have to be solved immediately. It seems the solution is mutually exclusive. However, we can achieve increase in fish harvesting not catching it and destroying it in its natural environment.

The sturgeon fish (namely the sturgeon species *Acipenser*) have an important commercial value, it was originally called as red fish for its especial value. Their meat is of a high value, the famous black caviar is more valuable product; more-over, the air-bladder supplies a valuable glue, the chord is consumed as dried spinal cord or vyaziga.

Considering the significant cut down in commercial stock of sturgeon fish in natural water reservoir the necessity of developing the commercial sturgeon culture became very acute. The countries of near and far abroad already developed the biotechnological ways and established replacement-breed stocks of various species and hybrid types of sturgeon fish to obtain the commercial product from it.

In Kazakhstan, commercial sturgeon culture is at its stage of establishment. In the current stage of aquaculture development the local agribusiness entities apply stocking material, artificial forage and technologies of sturgeon hatchery, developed and produced abroad. Such approach results in dependency of local fish-farmer from Foreign suppliers, from foreign market situation, from market fluctuation. The negative impact of reliance from import of the republican fish farmers can be avoided by development of local technologies of fish culture applied to conditions of Kazakhstan geographic location, biologically and economically efficient in the conditions of our country.

The Acipenser gueldenstaedtii is one of the objects of commercial sturgeon culture, most intensively explored by the fishery science. In 2008, the Republic of Kazakhstan for the first time developed the biotechnological methods of hatching the 2 year old Acipenser gueldenstaedtii in the ponds, in monoculture and polyculture with herbivorous fish (grass carp, silver carp). The results of experimental research showed big significance of ponds fish capacities on Russian sturgeon at hatching the 2 year olds of this species in polyculture with grass carp and silver carp.

A year later studies have been held and temporary recommendations were developed on hatching the 3 year olds of Russian sturgeon in designed ponds of carp fish farms. For the purpose of tracing the production potential of different size and weight groups of Russian sturgeon

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3 year olds, the experimental hatching of small, medium and large size and weight groups was carried out in different ponds.

The studies targeted changes in the values of length and mass as well as production potential of various size and weight groups of Russian sturgeon 3 year olds when hatching them in the ponds of carp fish farms in a polyculture with herbivorous fish.

Study tasks:

- Determine the variability in values of length and mass of Russian sturgeon 3 year of age hatched in the ponds in a polyculture with herbivorous fish
- Compare fish and biological indices of big, medium and small size and weight groups of Russian sturgeon 3 year of age, hatched in the ponds of carp fish farms in a polyculture with herbivorous fish

MATERIALS AND METHODS

The material used in studies were Russian sturgeons 2 year of age that wintered in wintering ponds; Russian sturgeons 3 year of age, hatched in designed ponds of carp fish farm in Almaty region. Upon unloading of wintering ponds 2 year of age were sorted to 3 size and weight groups: small size (average weight 170.68±4.18 g); medium (225.2±7.42 g) and big (353.7±20.3 g).

Each size and weight group of 2 year of age were placed into separate pond. Stocking density of Russian sturgeon 2 year of age:

- Big size and weight group 435 pcs ha^{-1}
- Medium size and weight group 500 pcs ha^{-1}
- Small size and weight group 490 pcs ha^{-1}

On the average the stocking density on experimental ponds was 475 pcs ha^{-1} which is equal to 50% from stocking density of Russian sturgeon 1 year of age at experimental hatching in the ponds in 2008 fish season (Anonymous, 1978).

Taking of values of weight and length of 3 year of age of different size and weight groups to determine production potential of their growth in ponds, determining the fleshing of 3 year of age prior to placing for wintering was made on the basis of the results of final (autumn) seining fish from ponds. The values of weight and length of sturgeon 3 year of age were processed by methods of biological statistics. Herewith each alternative determined the average value, mean-square deviation, variability index, errors of mean, modes, medians, asymmetry, excess (Lakin, 1990).

To compare the growth of different size and weight groups of 3 year of age Russian sturgeon, they used the values of weight gaining factor and other fish and biological indices catching density of 3 year of age, survival rate, absolute gain, average daily gain, fish capacity and a value of gross productivity of ponds on Russian sturgeons 3 year of age (Kupinsky *et al*., 1986).

RESULTS AND DISCUSSION

Static series of values of indicators of body weight (Q), zoological Length (L), body length up to the end of middle rays of tail fin (l), Fulton's condition factor ($y_{по}$) in big size group of Russian sturgeon 3 year of age hatched in polyculture with grass carp and silver carp are shown in Tables 1-4.

Table 1: Static series of values of body weight indicators (Q) in 3 year of age Russian sturgeons of big size and weight group

Bottom and top boundaries (g)	Mean value (g)	Incidence	
		n	Percentage
180.7-379.2	279.95	51	26.98
379.3-577.9	478.60	71	37.57
578.0-776.5	677.25	8	4.23
776.6-975.2	875.90	8	4.23
975.3-1173.8	1074.55	19	10.05
1173.9-1372.5	1273.20	11	5.82
1372.6-1571.1	1471.85	12	6.35
1571.2-1769.8	1670.50	4	2.12
1769.9-1968.4	1869.15	4	2.12
1968.5-2167.1	2067.80	1	0.53
Total	-	189	100.00

Table 2: Static series of values of zoological Length indicator (L) in 3 year of age Russian sturgeons of big size and weight group

Bottom and top boundaries (cm)	Mean value (cm)	Incidence	
		n	Percentage
42.18-45.80	43,990	29	15.34
45.81-49.42	47,615	58	30.70
49.43-53.05	51,240	31	16.40
53.06-56.67	54,865	9	4.76
56.68-60.29	58,485	7	3.70
60.30-63.91	62,105	19	10.05
63.92-67.54	65,730	20	10.58
67.55-71.16	69,355	13	6.88
71.17-74.78	72,975	2	1.06
74.79-78.40	76,595	1	0.53
Total	-	189	100.00

Table 3: Static series of values of indicator of body length up to the end of middle rays of tail fin (l) in 3 year of age Russian sturgeons of big size and weight group

Bottom and top boundaries (cm)	Mean value (cm)	Incidence	
		n	Percentage
31.52-34.66	33,090	34	17.99
34.67-37.80	36,235	38	20.11
37.81-40.95	39,380	42	22.22
40.96-44.09	42,525	14	7.41
44.10-47.23	45,665	9	4.76
47.24-50.38	48,810	22	11.64
50.39-53.52	51,955	14	7.41
53.53-56.66	55,.095	12	6.35
56.67-59.81	58,240	3	1.58
59.82-62.95	61,385	1	0.53
Total	-	189	100.00

During the analysis of data, provided in Table 1-3, we can find 2 "peaks" in indicators of 3 year of ages with the highest incidence of signs: on weight 380-577 g and 975-1571 g; on zoological length 45.8-49.4 and 60.30-71.10 cm on body length till the end of middle rays of tail fin 37.8-40.9 and 47.2-56.6 cm. This evidences on a big phenotypic diversity of Russian sturgeon hatched in designed ponds of carp fish farms.

As we see from the data provided, the highest incidence of the Fulton's condition factor is marked as 0.71-0.78 units. This corresponds the condition of a Russian sturgeon hatched at fish farms (Stroganov, 1968). Statistic characteristics of factors (indicators) of 3 year of age Russian sturgeons of big size and weight group hatched in separate ponds are shown in Table 5.

The analysis of data shown in Table 5 allows us to see the following. The value of variability index for body weight of 3 year of age of big size and weight group, exceeding 25% tells us about a significant variation in the mass indicator even inside this size and weight group. The difference of the mean value of 3 year of age body weight from the values of mode and median constitutes 40.88 and 29.38% accordingly. Together with the positive value of asymmetry it points us to prevalence of the species of small size group inside the big size and weight group hatched separately.

Table 4: Static series of values of condition indicator in three years of age Russian sturgeons of big size and weight group

Bottom and top boundaries (unit)	Mean value (unit)	Incidence	
		n	Percentage
0.56-0.63	0,595	3	1.59
0.64-0.70	0,670	12	6.35
0.71-0.78	0,745	58	30.69
0.79-0.85	0,820	49	25.93
0.86-0.92	0,890	36	19.05
0.93-0.99	0,960	21	11.11
1.00-1.07	1,035	4	2.12
1.08-1.14	1,110	3	1.58
1.15-1.21	1,180	0	0.00
1.22-1.28	1,250	3	1.58
Total	-	189	100.00

Values of the variability index for zoological length, body length up to the end of middle rays of tail fin are within 11-25% (for the value of zoological length closer to the bottom boundary of variability index; indicator of body up to the end of middle rays of tail fin within the middle of index values for average variation) which tells us about average variation of these factors.

The difference of the average value of zoological body length of 3 year of age of Russian sturgeon in the big size and weight group from the values of mode and median constitutes 7.43 and 6.30% correspondingly; the mean value of body length up to the end of middle rays of tail fin from values of mode and median 8.58 and 4.04% accordingly that also evidences on average variation of these factors. The values of asymmetry that are close to zero, tell us about low asymmetry of variation curve, showing the prevalence of middle length species. The significant share of species with medium length values is confirmed by negative values of excess, calculated for the body length factors (Lakin, 1990).

As for the condition factor, the variability index value also falls within 11-25% indicating that Fulton's condition values for 3 year of age Russian sturgeons in big size and weight group have average variation (Jafaryan *et al*., 2009a, b). The difference of mean value of 3 year of age condition from values of mode and median constitutes 12.05 and 1.20%, correspondingly, evidencing the average variation of condition factor. However, the species with average condition factors constitute the majority (Shevchenko *et al*., 1998).

The variation ranges of values of factors of body weight (Q), zoological Length (L), body length up to the end of middle rays of tail fin (l), Fulton's condition ($y_{П\Phi}$) for 3 year of age Russian sturgeons in middle size and weight group are shown in Table 6- 9.

Statistical characteristics of factors (indicators) for 3 year of age Russian sturgeons in middle size and weight group are shown in Table 10. Analysis of data shown in Table 10 helps us to see the following.

Table 5: Statistic characteristics of factors (indicators) of 3 year of age Russian sturgeons of big size and weight group based on data of final seining fish from a pond

Statistic characteristics	Factors (indicators)			
	Body weight (Q, g)	Zoological Length (L, cm)	Body length up to the end of middle rays of tail fin (l, cm)	Fulton's condition ($y_{П\Phi}$, unit)
Mean value (X±m)	709.49±9.65	53.69±0.63	41.59±0.53	0.83±0.008
Mean-square deviation (σ)	421.96	8.61	7.28	0.11
Variability index (C_v, %)	59.47	16.03	17.51	13.38
Median (Me)	501.01	50.31	43.27	0.82
Mode (Mo)	419.43	49.70	38.02	0.73
Asymmetry (As)	1.10>0 (positive asymmetry)	0.69>0 (asymmetry)	0.66>0 (asymmetry)	1.01>0 (asymmetry)
Excess (Ex)	675.05>0 (very steep peak curve)	-0.89<0 (flat peak (double-peaked) curve)	-0.71<0 (flat peak (double-peaked) curve)	2.12>0 (steep peak curve)

The value of variability index for the body weight of 3 year of age of middle size and weight group exceeding 25% tells us about significant variation of weight factor. The difference of the mean value of the body weight of 3 year of age of middle size and weight group from values of mode and median constitutes 15.40 and 10.08% accordingly; together with the positive value of asymmetry it points at prevalence of the species of middle size group inside the middle size and weight 3 year of age group (Lakin, 1990).

Table 6: Variation ranges of values of factors of body weight (Q) for 3 year of age Russian sturgeons in middle size and weight group

Bottom and top boundaries (g)	Mean value (g)	Incidence	
		n	Percentage
105.2-294.7	199.95	11	39.29
294.8-484.2	389.50	13	46.43
484.3-673.7	579.00	1	3.57
673.8-863.2	768.50	1	3.57
863.3-1052.7	958.00	1	3.57
1052.8-1242.2	1147.50	0	0.00
1242.3-1431.7	1337.00	1	3.57
Total	-	28	100.00

Table 7: Variation ranges of values of zoological length factor (L) for 3 year of age Russian sturgeons in middle size and weight group

Bottom and top boundaries (cm)	Mean value (cm)	Incidence	
		n	Percentage
37.76-42.23	39,995	8	28.57
42.24-46.71	44,475	9	32.15
46.72-51.19	48,955	7	25.00
51.20-56.67	53,935	1	3.57
56.68-60.15	58,415	2	7.14
60.16-64.63	62,395	0	0.00
64.64-69.11	66,875	1	3.57
Total	-	28	100.00

Table 8: Variation ranges of values of factor of body length up to the end of middle rays of tail fin (l) for 3 year of age Russian sturgeons in middle size and weight group

Bottom and top boundaries (cm)	Mean value (cm)	Incidence	
		n	Percentage
28.13-32.86	30,495	5	17.86
32.87-37.60	35,235	15	53.57
37.61-42.33	39,970	4	14.29
42.34-47.07	44,705	2	7.14
47.08-51.81	49,445	1	3.57
51.82-56.55	54,185	0	0.00
56.56-61.29	58,925	1	3.57
Total	-	28	100.00

The values of variability index for zoological length, body length up to the end of middle rays of tail fin and Fulton's condition are within 11-25% closer to the bottom boundary of indicated interval that tells about middle variation of these factors (Noori *et al*., 2002).

Difference of average value of zoological length of 3 year of age Russian sturgeon in middle size and weight group from values of mode and median constitutes 8.64 and 2.77% correspondingly; average value of body length up to the end of middle rays of tail fin from values of mode and median constitutes 5.71 and 2.41% correspondingly that evidences on distribution of these factors to close to normal. Asymmetry values show average asymmetry of variation curve that shows the prevalence of the medium length species.

Difference of average value of Fulton's condition of 3 year of age Russian sturgeon in middle size and weight group from values of mode and median constitutes 12.16 and 10.81% correspondingly; average value of body length up to the end of middle rays of tail fin from values of mode and median constitutes 5.71 and 2.41% correspondingly that evidences on distribution of these factors to close to normal. Asymmetry values show average asymmetry of variation curve that shows the prevalence of the medium length species (Milstein, 1982).

Difference of average value of Fulton's condition of 3 year of age Russian sturgeon in middle size and weight group from values of mode and median constitutes 12.16 and 10.81% correspondingly that evidences on distribution of these factors to close to normal.

Table 9: Variation ranges of values of condition factor for three years of age Russian sturgeons in middle size and weight group

Bottom and top boundaries (unit)	Mean value (unit)	Incidence	
		n	Percentage
0.44-0.58	0,510	5	17.86
0.59-0.73	0,660	10	35.71
0.74-0.87	0,805	10	35.71
0.88-1.02	0,950	1	3.57
1.03-1.17	1,100	1	3.57
1.18-1.32	1,250	0	0.00
1.33-1.48	1,405	1	3.57
Total	-	28	100.00

Table 10: Statistical characteristics of factors for three years of age Russian sturgeons in middle size and weight group

Statistic characteristics	Factors (indicators)			
	Body weight (Q, g)	Zoological Length (L, cm)	Body length up to the end of middle rays of tail fin (l, cm)	Fulton's condition ($y_{Π}$, unit)
Mean value (X±m)	376.48±46.58	46.52±1.20	36.59±1.12	0.74±0.033
Mean-square deviation (σ)	246.49	6.36	5.91	0.173
Variability index (C_v, %)	65.47	13.67	16.15	23.32
Median (Me)	338.53	45.23	35.71	0.66
Mode (Mo)	318.49	42.50	34.50	0.65
Asymmetry (As)	2.60>0 (positive asymmetry)	1.39>0 (positive asymmetry)	2.31>0 (positive asymmetry)	1.91>0 (positive asymmetry)
Excess (Ex)	6.69>0 (flat-topped curve)	2.01>0 (flat-topped curve)	5.59>0 (flat-topped curve)	5.93>0 (flat-topped curve)

Asymmetry values show average asymmetry of variation curve, that shows the prevalence of medium fleshness species inside middle size and weight group.

The variation ranges of values of factors of body weight (Q), zoological Length (L), body length up to the end of middle rays of tail fin (l), Fulton's condition ($y_{Ш\Phi}$) for 3 year of age Russian sturgeons in small size and weight group are shown in Table 11-14.

Table 11: Variation ranges of values of factors of body weight (Q) for 3 year of age Russian sturgeons in small size and weight group

Bottom and top boundaries (g)	Mean value (g)	Incidence n	Incidence Percentage
210.28-289.72	250.00	3	3.80
289.73-369.17	329.45	30	37.97
369.18-448.62	408.90	30	37.97
448.63-528.07	488.35	10	12.66
528.08-607.52	567.80	1	1.27
607.53-686.79	647.16	1	1.27
686.80-766.42	726.61	2	2.53
766.43-845.88	806.16	2	2.53
Total	-	79	100.00

Table 12: Variation ranges of values of zoological length factor (L) for 3 year of age Russian sturgeons in small size and weight group

Bottom and top boundaries (cm)	Mean value (cm)	Incidence n	Incidence Percentage
40.58-42.81	41,695	3	3.80
42.82-45.04	43,930	14	17.72
45.05-47.28	46,165	29	36.72
47.29-49.51	48,400	18	22.78
49.52-51.74	50,630	7	8.86
51.75-53.98	52,865	2	2.53
53.99-56.21	55,100	2	2.53
56.22-58.45	57,335	4	5.06
Total	-	79	100.00

Table 13: Variation ranges of values of factor of body length up to the end of middle rays of tail fin (l) for 3 year of age Russian sturgeons in small size and weight group

Bottom and top boundaries (cm)	Mean value (cm)	Incidence n	Incidence Percentage
30.98-33.21	32.095	3	3.80
33.22-35.46	34.340	18	22.78
35.47-37.71	36.590	29	36.70
37.72-39.95	38.835	22	27.85
39.96-42.20	41.080	1	1.27
42.21-44.45	43.330	2	2.53
44.46-46.70	45.580	1	1.27
46.71-48.95	47.830	3	3.80
Total	-	79	100.00

Table 14: Variation ranges of values of condition factor for 3 year of age Russian sturgeons in small size and weight group

Bottom and top boundaries (unit)	Mean value (unit)	Incidence n	Incidence Percentage
0.458-0.514	0.4860	1	1.27
0.515-0.571	0.5430	0	0.00
0.572-0.627	0.5995	0	0.00
0.628-0.684	0.6560	7	8.86
0.685-0.741	0.7130	21	26.58
0.742-0.798	0.7700	23	29.11
0.799-0.855	0.8270	22	27.85
0.856-0.912	0.8840	5	6.33
Total	-	79	100.00

Based on the data from Table 11-14 statistical characteristics of studied factors were determined. Statistical characteristics of factors (indicators) for 3 year of age Russian sturgeons in middle size and weight group are shown in Table 15.

Analysis of data shown in Table 10 helps us to see that the value of variability index for the body weight of 3 year of age of small size and weight group exceeding tells us about significant variation of weight factor (Jafaryan *et al*., 2009b; Hafezieh *et al*., 2009; Vasilyeva, 2006). However, obtained value of variability index (26.86%) is way lower compared to 3 year of age Russian sturgeons in medium size and weight group (65.47%) including 3 year of age Russian sturgeons in big size and weight group (59.47%). It tells of the lower variation of weight in small 3 year of age.

The difference of the mean value of the body weight of 3 year of age of small size and weight group from values of mode and median constitutes 9.04 and 4.80% accordingly; together with the positive value of asymmetry it points at prevalence of the species of middle size group inside the small size and weight 3 year of age group. The analysis of difference between values of average weight of 3 year of age from mode and median for different size and weight groups helps us to see that these differences increase as they move from small size and weight group to the big one.

The values of variability index for zoological length, body length up to the end of middle rays of tail fin and Fulton's condition are within 11% that tells us about low variation in these factors. Variation of values of Fulton's condition factor is low.

Difference of average value of zoological length of 3 year of age Russian sturgeon in small size and weight group from values of mode and median constitutes 4.14 and 1.64% correspondingly; average value of body length up to the end of middle rays of tail fin from values of mode and median constitutes 3.91 and 1.12% correspondingly that evidences on distribution of these factors, to close to normal. Values of asymmetry and excess evidence on prevalence of medium length species (Kozlov and Abramovich, 1991).

Difference of average value of Fulton's condition of 3 year of age Russian sturgeon in small size and weight group from values of mode and median constitutes 2.75 and 0.39% correspondingly that evidences on distribution of these factors to close to normal (Vasilyeva, 2006; Ponomarev and Magomayev, 2011; Fedorov, 2011).

Fish and biological indices of hatching different size and age groups of 3 year of age Russian sturgeon hatched in the ponds in polyculture with herbivorous fish based on the results of autumn (final) seining fish from ponds are shown in Table 16 (Stroganov, 1968).

Table 15: Statistical characteristics of factors for 3 year of age Russian sturgeons in small size and weight group

Statistic characteristics	Factors (indicators)			
	Body weight (Q, g)	Zoological Length (L, cm)	Body length up to the end of middle rays of tail fin (l, cm)	Fulton's condition ($y_{\text{по}}$, unit)
Mean value (X±m)	405.88±12.27	47.56±0.39	37.34±0.36	0.765±0.0077
Mean-square deviation (σ)	109.02	3.49	3.19	0.069
Variability index (C_v, %)	26.86	7.34	8.54	9.02
Median (Me)	386.39	46.78	36.92	0.768
Mode (Mo)	369.18	45.59	35.88	0.744
Asymmetry (As)	1.89>0 (positive asymmetry)	1.12>0 (positive asymmetry)	1.43>0 (positive asymmetry)	-0.76<0 (negative asymmetry)
Excess (Ex)	4.15>0 (flat-topped curve)	1.38>0 (flat-topped curve)	2.82>0 (flat-topped curve)	1.75>0 (flat-topped curve)

Table 16: Fish and biological indices 3 year of age Russian sturgeon, hatched in monoculture and polyculture with herbivorous fish

Indices (UoM)	Size and weight groups of 3 year of age Russian sturgeon		
	Big	Middle	Small
Stocking density for 2 year of age (pcs ha^{-1})	435	500	490
Average weight for 2 year of age upon stocking (g)	353.70±20.30	225.20±7.42	170.68±4.18
Survival rate for 3 year of age (%)	100	95	80
Average weight for 3 year of age upon catching (g)	709.49±9.65	376.48±46.58	405.88±12.27
Absolute gain (g)	355.79	151.28	235.20
Average daily gain (g day^{-1})	2.22	0.95	1.47
Fish capacity of ponds for 3 year of age of Russian sturgeon (kg ha^{-1})	154.77	71.86	92.20
Output (gross product) for 3 year of age of Russian sturgeon (kg ha^{-1})	308.63	178.83	159.10

Table 16 shows that the highest fish capacity falls within 3 year of age of a big size and weight group, followed by descending value of small group and ended up with middle size and weight group of 3 year of age. The weight gain coefficient for 3 year of age of Russian sturgeon in big size and weight group constituted 0.035; the 3 year of age in middle size and weight group is 0.018; the 3 year of age in small size and weight group is 0.035. As we see from provided data, the 3 year of age in big and small size and weight groups have similar values of weight gain coefficient (Fedorov *et al*., 2012; Badryzlova *et al*., 2014; Chernomashentsev and Milshtain, 1983).

Big value of fish capacity for 3 year of age in small group compared to the middle is explained originally higher natural fish capacity for Russian sturgeon (Stroganov, 1968; Kozlov and Abramovich, 1986; Grozesku *et al*., 2009).

CONCLUSION

All size and weight groups of 3 year of age of Russian sturgeon show significant variability in body weight. The index of weight from big to small size and weight group traces a decrease in variability coefficient, a stable trend of decrease in difference between average value of weight, mode and median.

The values of zoological body length factor from big to small size and weight group also traces the decrease in variability coefficient, a stable trend towards decrease in difference between average value of weight, mode and median.

The values of body length up to the end of middle rays of tail fin from big to small size and weight group also traces the decrease trend in difference between average value of weight, mode and median. As for the variability coefficient of this factor, no regularities in variability were found during the studies. For Fulton's condition factors no regularities in variability were found during the studies.

The highest fish capacity when hatching in ponds is observed at 3 year of age Russian sturgeon in big size and weight group. When hatching the middle and small size and weight groups of 3 year of age the fish capacity is mainly determined by the original fish capacity of ponds on Russian sturgeon; no distinct trend and dependence from variability in body weight is observed in this case.

We observe decrease in values of output (gross product) of 3 year of age when hatched in ponds from big to small size and weight group. The same is observed for the values of survival rate factors.

The highest values of absolute and average daily gain during hatching in ponds are observed in 3 year of age Russian sturgeon of big size and weight group. When hatching the middle and small size and weight groups of 3 year of age the absolute and average daily gain are mainly determined by the original level of ponds' fish capacity for Russian sturgeon.

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