

Definition of fertility and level of maturity of sexual products

Objective: Learn how to determine the maturity of gonads, calculate absolute and relative fecundity of fish

Materials and equipment: fixed or fresh fish – 5–8 species. Tables: "Reproduction organs of fish." Tools: scissors, scalpel, dissecting needles, ruler, cuvettes, Petri dishes, tweezers, filter paper, foil, microscope, eyepiece micrometer, torsion, pharmaceutical and technical scales

Basic theoretical information

Materials for determining the fertility of fish are taken simultaneously with sampling for establishing the age and growth. Numbers of samples for determination the age and fertility should be kept as all other data records and labels. However, the number of taken samples can be much less because of that numbers can gain spaces. After measurements and taking scales fish is dissected to determine the sex and sampling to establish fertility

To determine the fertility of fish roe samples are taken in the middle section of roe in the fourth stage of maturity. Caviar is weighed on pharmaceutical scales and fixed in alcohol with 2% formalin solution (1:1). For fish that have large eggs (pike, catfish), sample weight should be 2–5 g, and for fish with fine caviar it should be 1 g. Sample is accompanied by a foil label, which indicates the date, place of catch, species, serial number fish in the journal, body length, total weight, weight of roe, the number of taken spawn

Absolute fecundity of fish directly depends on the length of the body, so for its definition material must be collected at least 5 samples from individuals of each size class - bream, roach, silver bream, carp, tench, perch, sabrefish, rudd [10, 11]. For such fish as carp, pike, perch, herbivorous fish class interval of 3 cm is enough

To determine the maturity of sexual products of fish, it is necessary to use a following universal scale

Stage I – juvenile [12]. Immature individuals, poorly developed gonads, look like thin transparent strands, sex cannot be determined with the naked eye

Stage II. Individuals that mature or individuals with sexual products that develop after spawning. Sex glands are small. The eggs are so small that they are invisible. However, the sex can be determined. There is quite thick blood vessel along the ovaries. Milt is transparent

Stage III. The gonads are relatively well developed. Ovaries occupy from 1/3 to 1/2 of volume of abdomen and filled with small transparent eggs of different colors. The eggs are hardly separated from the internal partitions. Testes are tight and taut their surface is pink. .After the cut their edges do not deliquesce and stay sharp

Stage IV. Eggs and sperm have almost reached full development. The eggs are large enough and can be easily separated one from another. Color of ovarian of fish varies. Milt is milk-white, easily flows after pressing

Stage V. Fluent individuals. Eggs and sperm are so mature that after the light pressing on the abdomen they freely flow from the genital opening. Volume of the gonads from the beginning of spawning to the end is rapidly declining. Stage is brief

Stage VI. Slaughter. These are individuals that have spawned. Sex glands are small, puffy, swollen and full of blood. The eggs remaining in the glands dissolve. After a few days the inflammation goes down and gonads pass in the second stage of development

If sex products are in the intermediate stage and it is difficult to identify, the designation consists of two numbers connected by a dash, but the stage to which the development of sexual products is closer, is put at the beginning

Individual absolute fertility (IAF) is the number of mature eggs in the ovaries of a fish. It is calculated by weighting method

$$IAF = g \times n$$

.where: g – is ovarian mass, g & n – is a number of eggs in 1 g of sample

Absolute fertility (AF) is an average number of eggs in females of certain group of fish (dimensional, age) for the spawning season

The relative fertility of fish (RF) is the number of eggs per unit of weight or per unit of body length of fish. It is calculated by the formula

$$= RF$$

$$AF m$$

.(where: AF – is absolute fertility; m – is fish mass, (g

Working (physiological) fertility (WF) is the number of eggs that really laid by the female per spawning season (in fish culture it is measured by the number of eggs in 1 g or 1 cm³ of .sample for a particular female). Other indicators of fertility are derived from absolute

Progress of work

.1 The fish is distributed by species and each individual is numbered

.2 Weigh and determine the absolute length

.3 Determine the age of the fish

.4 Make dissection of abdomen to determine the sex of individuals and maturity of sexual products by the six-point scale

.5 Remove the ovaries of females, weigh and select sample of 1 g to count eggs. If eggs are large enough samples may be 3–5 g. If it is necessary to fix eggs they are tied in cheesecloth .with a label and placed in a bank with 2% formalin

.6 The eggs are divided by dissecting needles and counted in the Petri dish with a dark bottom. Number of eggs in sample is recorded and 20 eggs are measured in diameter. To determine the mass of raw eggs 100 eggs are dried and weighed using torsion balance accurate to 0.0005 g. For fish that spawn in portions a part of first sample is separated and .then 1/2 – 1/5 part from it is taken for measurement

.7 When using the microscope eyepiece micrometer diameter of 200 eggs is measured, the other are counted, but no more than 500–1000 pieces. Caviar remaining after counting of .(1000 pcs., is dried, weighed and counted by weight (the average weight of eggs

.8 Determine the absolute and relative fertility of each of the studied females. The data is :pointed into a Table 4

