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Some haematochemical parameters of intensively farmed rainbow trout

(*Oncorhynchus mykiss*)

V. Vigiani, P. Lupi, M. Mecatti

Dipartimento Scienze Zootecniche, Università di Firenze, Italy

Corresponding author: Valentina Vigiani, Dipartimento Scienze Zootecniche, Via delle Cascine 5, 50144 Firenze, Italy – Tel: +39 055 3288262 – Fax: +39 055 321216 – Email: bernesi2002@yahoo.it

RIASSUNTO – Alcuni parametri ematici di trote iridee (*Oncorhynchus mykiss*) allevate intensivamente. *L'obiettivo del presente studio è quello di giungere ad una prima definizione dei valori di alcune variabili ematiche di una delle specie di maggiore interesse economico nel panorama dell'acquacoltura italiana. La determinazione del profilo metabolico (PM) di una specie non è semplice a causa dei molti fattori che influiscono sui parametri ematici, tuttavia la determinazione dei valori di riferimento è necessaria per individuare i limiti al di fuori dei quali si possono verificare contrazioni della produzione e della riproduzione.*

Key words: trout, blood parameters, metabolic profile.

INTRODUCTION – The aim of the present study was a preliminary determination of the metabolic profile (MP) of one of the most economically valuable species on the Italian market. Defining the metabolic profile (MP) of a species is not easy because of many factors affecting the blood parameters, but assessing the normality values is necessary to identify the limits out of which a production or reproduction decrease can happen.

MATERIAL AND METHODS – Blood samples of 174 rainbow trout (initial weight: 52.5±9.7 g; final weight: 795.0±238.5 g) were collected once a month between November 2003 and September 2004 from 15 fish from the same stock. Rainbow trout were reared in the intensive farm “Azienda Agroittica F.lli Giovannetti” (Tereglio, LU). All the fish were weighed immediately after sampling.

Trout were randomly caught in the morning and anaesthetised (Ethylene glycol monophenyl ether, 0.4 cc/l), blood was drawn puncturing the dorsal aorta with a 2.5 ml sterile plastic syringe and was divided into BD Vacutainer serum tubes and EDTA (K3) tubes. The haematocrit (Hct) was measured in the farm immediately after sampling utilising micro-haematocrit heparinized capillary tubes, after centrifugation at 3600 rpm for 5 min (Redacrit centrifuge), then sample tubes were refrigerated and carried to the laboratory where plasma and serum were obtained by centrifugation at 3000 rpm, 30 min, 2°C (ALC 4227R), transferred in Eppendorf tubes and stored at –20°C until the moment of analysis.

The following analyses were performed with a Super Z 818 biochemical analyzer using Sclavo Diagnostics International S.r.l. clinical chemistry kits:

- Plasma Glucose (GLU): colorimetric determination with oxidase-peroxidase;

- Plasma Total Protein (TP): colorimetric determination with biuret-tartrate;
- Plasma Albumin (ALB): colorimetric determination with BCG;
- Plasma Globulin (GL): calculated as [Total Protein – Albumin];
- Plasma Total Cholesterol (TCho): enzymatic colorimetric determination;
- Serum Calcium (Ca): colorimetric determination with o-Cresolphthalein;
- Serum Inorganic Phosphorus (IP): colorimetric determination with phosphomolibdate;
- Serum Magnesium (Mg): colorimetric determination with Xylidine-Blue;
- Serum Chloride (Cl-): colorimetric determination with Mercury Thiocyanate.

RESULTS AND CONCLUSIONS – The mean trout Hct (Table 1) was much lower than what reported by the literature (Řehulka *et al.*, 2004) for the same species, probably because this parameter varies according to environmental conditions and its value can be considered an adaptation of the blood cells producing activity of the spleen to the environment (Wells and Weber, 1990; Pearson and Stevens, 1991); trout infact lives in cold and abundantly oxygenated waters, requesting a lower number of erythrocytes respect of other temperate farming species such as sea bass, coping with harder DO conditions. The glicemic blood content also varies greatly with the environment, especially according to the water temperature (Lusková, 1998) and for this reason it can't be considered a good species characterizing parameter. TP on the contrary is a stable value, showing little individual variability, even if values found in this study are lower than what reported by McCarthy *et al.* (1975). There is no literature data on the GL, ALB and Albumin/Globulin fraction in trout, but the mean ALB content in this study is higher of that of sea bass and sea bream (Pavlidis *et al.*, 1997), suggesting an interspecific difference to be convalidated and strengthen with other studies. The blood Tcho had a high CV%, probably because of the size of the fish used and tends to vary greatly according to the age and to the season (Kavadias *et al.*, 2001). The electrolytes give a view on the osmotic status and mineral balance of the fish, but can't be very characterizing of a species because of their trend to vary according to the water and feed quality.

Table 1. Haematic values (means ± sd) of rainbow trout and their coefficient of variation (CV).

	Mean ±	
Hct (%)	29.6 ± 6.6	23.0
GLU (mmol/l)	4.69 ± 1.46	31.13
TP (g/dl)	3.57 ± 0.83	23.25
ALB (g/dl)	1.83 ± 0.44	24.04
GL (g/dl)	1.74 ± 0.68	39.08
TCho (mmol/l)	3.73 ± 1.22	32.71
IP (mmol/l)	4.84 ± 1.25	25.83

Mg (mmol/l)	0.85 ± 0.27	31.76
Ca (mmol/l)	3.21 ± 1.03	32.09
Cl ⁻ (mmol/l)	117.92 ± 7.87	6.67

The reference ranges given (Table 2), obtained by eliminating the tails of the distribution (25%) due to the high variability of this kind of data, are a first characterization of intensively farmed rainbow trout for the MP assessment. These values, not always easy to be interpreted, request more investigation and for this reason we are developing additional studies.

Table 2. Reference ranges proposed for some haematic parameters of farmed rainbow trout.

Percentiles	12	87
Hct (%)	21.88	36.99
GLU (mmol/l)	2.98	6.33
TP (g/dl)	2.60	4.50
ALB (g/dl)	1.31	2.32
GL (g/dl)	0.94	2.50
TCho (mmol/l)	2.30	5.11
IP (mmol/l)	3.38	6.24
Mg (mmol/l)	0.54	1.15
Ca (mmol/l)	1.99	4.37
Cl ⁻ (mmol/l)	108.69	126.76

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