

*
(// : // :)

(*Salmo trutta caspius*)

(FFF) (// ± g)

(FSF) (SSS) (FS)

(SF)

FFF (P<0.05) SSS FS

() FFF

() (P<0.05)

FS (mOsmol/kg) FFF

(P<0.05) mOsmol/kg SSS mOsmol/kg

Salmo trutta caspius :

(Toften *et al.*, 2003)

Furne Gurney *et al.*, 2003)

(*et al.*, 2008;

Stradmeyer, 1994;)

(Usher *et al.*, 1991
(*Salmo salar*)

(Milaja, 2006)

Stradmeyer, 1994)

(2003) Toften (McCarthy *et al.*, 1996; Evans *et*) Hyperosmoregulation
(*al.*, 2005

Usher .

Jobling Jørgensen

(

(Baldisserotto *et al.*, 2005)

(*Salmo trutta caspius*) Hypoosmoregulation

(Evans *et al.*, 2005)

(Oulad *et al.*, 2010)

Vijayan *et*)

(*al.*, 1996

) SF FSF SSS FS FFF :

(
(Falahatkar *et al.*, 2007)

mg l⁻¹
(Sudagar *et al.*, 2009)

Pooling

+) / ±
(Kiron *et al.*, 2004)

×g

(Fresh Water: FW)

±
±
± /

± / pH

(Uchida *et al.*, 1996)

)

(

(S²)

(F¹)

¹ Feeding
² Starvation

...

Jenway) ()
(pfp 7, England

(/ mEq/L) FFF
SSS FS
/ /
/ SF FSF
(P<0.05)
)
A .(

USA) RA-1000
(TECNICON
(Krayushkina, 2006)
(OsmoTech, England)
(Krayushkina, 2006)

Leven

SSS FS
SF FSF
(A)
(Jackson *et al.*, 2005)
SPSS
Excel

(B)
(SSS FS)
FSF) (mOsmol/kg) FFF
FS (SF

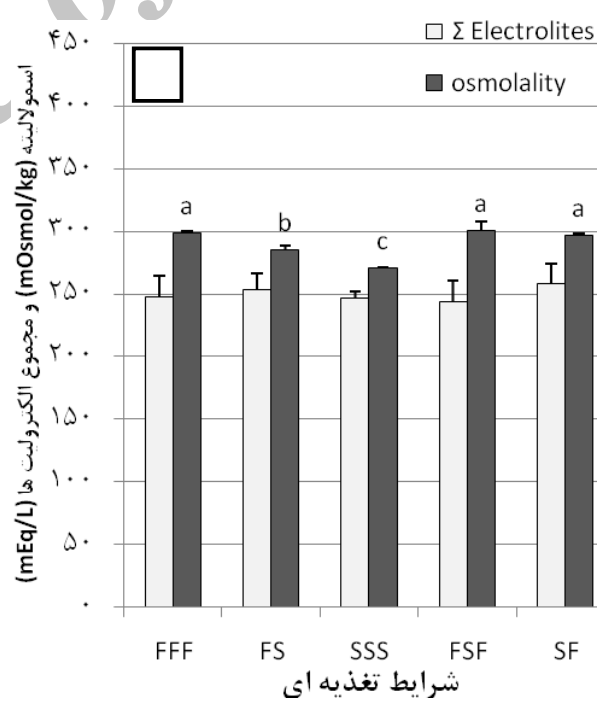
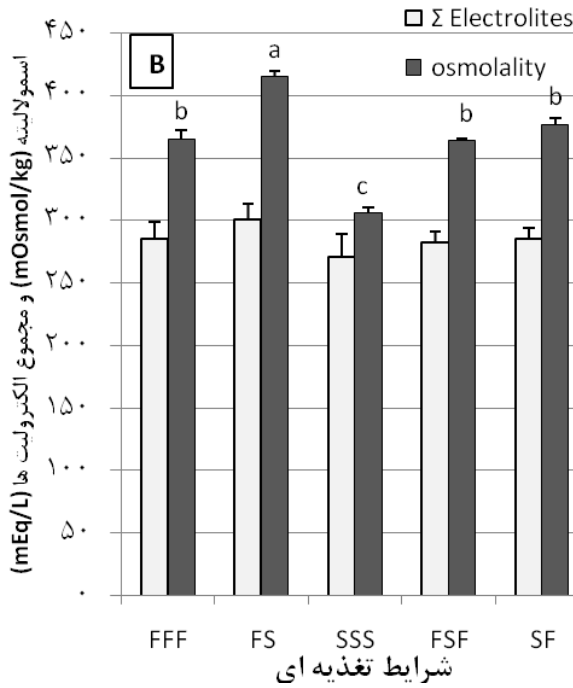
SSS
(B)

³ Completely Randomized Design
⁴ One Way ANOVA

()
 SF FSF SSS FS FFF)
 ()
 n=) . ± (SW) (FW)
 (P<0.05) . (

FSF	SF	SSS	FS	FFF	
±	± /	± /	± /	±	FW
± /	±	± /	± /	±	CSW
/ ± /	/ ± /	/ ± /	/ ± /	/ ± /	FW
/ ± /	/ ± /	/ ± /	/ ± /	/ ± /	CSW
/ ± /	/ ± /	/ ± /	/ ± /	/ ± /	FW
/ ± / ^b	/ ± / ^b	/ ± / ^a	/ ± / ^a	/ ± / ^c	CSW
/ ± /	/ ± /	/ ± /	/ ± /	/ ± /	FW
/ ± / ^b	/ ± / ^{ab}	/ ± / ^b	/ ± / ^a	/ ± / ^a	CSW

(P<0.05)



()
 SF FSF SSS FS FFF)
 :A ()
 n=) . ± (SW) :B (FW)
 (P<0.05) . (

...

(Taylor and Grosell, 2006)

(ppt)

Jürss *et al.*,)

(Kültz and Jürss, 1991) (1987

Na⁺K⁺-ATPase

Na⁺K⁺-ATPase

(1991) Jürss Kultz

(Stefansson *et al.*, 2009)

(1996)

Vijayan

(Tseng and Hwang, 2008)

(B A)

Ferreire

(2005)

Stubhaug *et al.*,)

(1986)

()

Dabrowski

(2006; Lim and Webster, 2001

⁵ Osmolyte

Liebert and)

(Schreck, 2006; Stefansson *et al.*, 2009

(Levings *et al.*, 1994; Andreassen *et al.*, 2001)

(FSF SF)

(Emadi, 2010; Fallah, 2009)

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The Effect of Starvation and Refeeding Periods on Iono-osmoregulation of 2+ Caspian Trout

J. Amiri Moghaddam^{1*}, F. Maniei², S. Khodabandeh³ and J. Imanpoor Namin²

¹Fisheries Group, Natural Resources and Marine Sciences Department, Tarbiat Modares University, Noor, I.R. Iran

² Fisheries Group, Natural Resources Department, Guilan University, Some`e Sara, I.R. Iran

³ Marine Biology Group, Natural Resources and Marine Sciences Department, Tarbiat Modares University, Noor, I.R. Iran

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Abstract

Effects of different nutritional conditions on iono-osmoregulation in juvenile of Caspian trout (*Salmo trutta caspius*) parrs were studied. Following adaption to the new environment, 750 Caspian trout parrs (12.5±1 g) were kept under the treatments of six weeks of full feedings (FFF), three weeks of feeding-three weeks of starvation (FS), six weeks of starvation (SSS), two weeks of feeding-two weeks of starvation-two weeks of re-feeding (FSF) and three weeks of starvation-three weeks of re-feeding (SF). Fish were fed with rainbow trout commercial feed three times a day up to satiation. There was no significant difference in serum sodium, chloride, potassium and magnesium between treatments, but serum osmolality decreased from 299 mOsmolkg⁻¹ in FFF to 286 and 271 mOsmolkg⁻¹ in FS and SSS (P <0.05), and re-feeding, after starvation periods, compensated the osmolality reduction to the similar levels in FFF. Five days after transferring the parrs to Caspian Sea (salinity: 13 gL⁻¹), serum magnesium reached to 3.55 and 3.40 mEqL⁻¹ in FS and SSS respectively (P <0.05), in comparison to FFF group (2.36 mEqL⁻¹). Serum potassium showed also irregular significant difference between treatments (P <0.05), while chloride and sodium presented no significant difference. Serum osmolality levels increased to a maximum of 415 mOsmolkg⁻¹ in FS and were decreased to a minimum of 306 mOsmolkg⁻¹ in SSS (P<0.05), compare to FFF (366 mOsmolkg⁻¹). We concluded that starvation has negative effects on ion regulatory capacity of Caspian trout parrs and although re-feeding can increase this capacity but effects of long period starvation cannot be compensated.

Keywords: *Salmo trutta caspius*, Starvation, Refeeding, Osmoregulation.