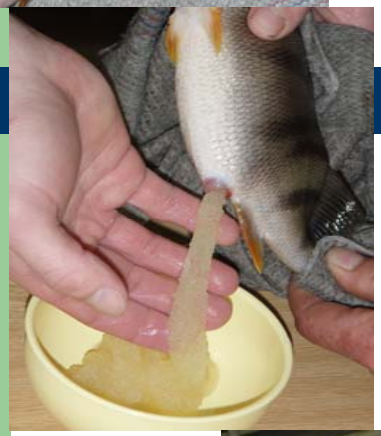
UNIVERSITY OF SOUTH BOHEMIA IN ČESKÉ BUDĚJOVICE
FACULTY OF FISHERIES & PROTECTION OF WATERS

INTENSIVE REARING OF EURASIAN PERCH (*Perca fluviatilis* L.)

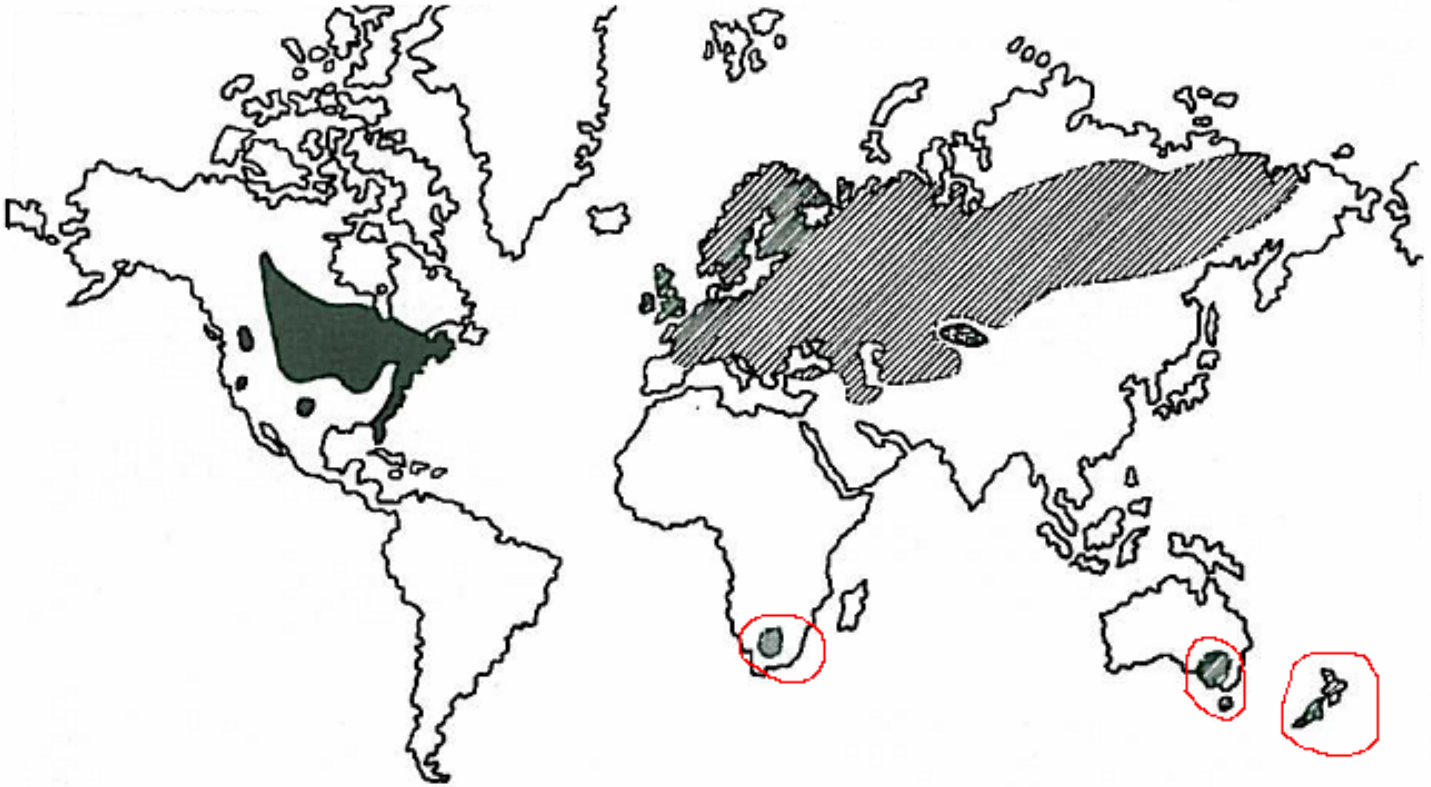
Jan KOUŘIL, Assoc. Prof., Dipl. Ing., Ph.D. (kouril@vurh.jcu.cz)
Vlastimil STEJSKAL, Dipl. Ing., Ph.D.

Szarvas, Hungary, 2010

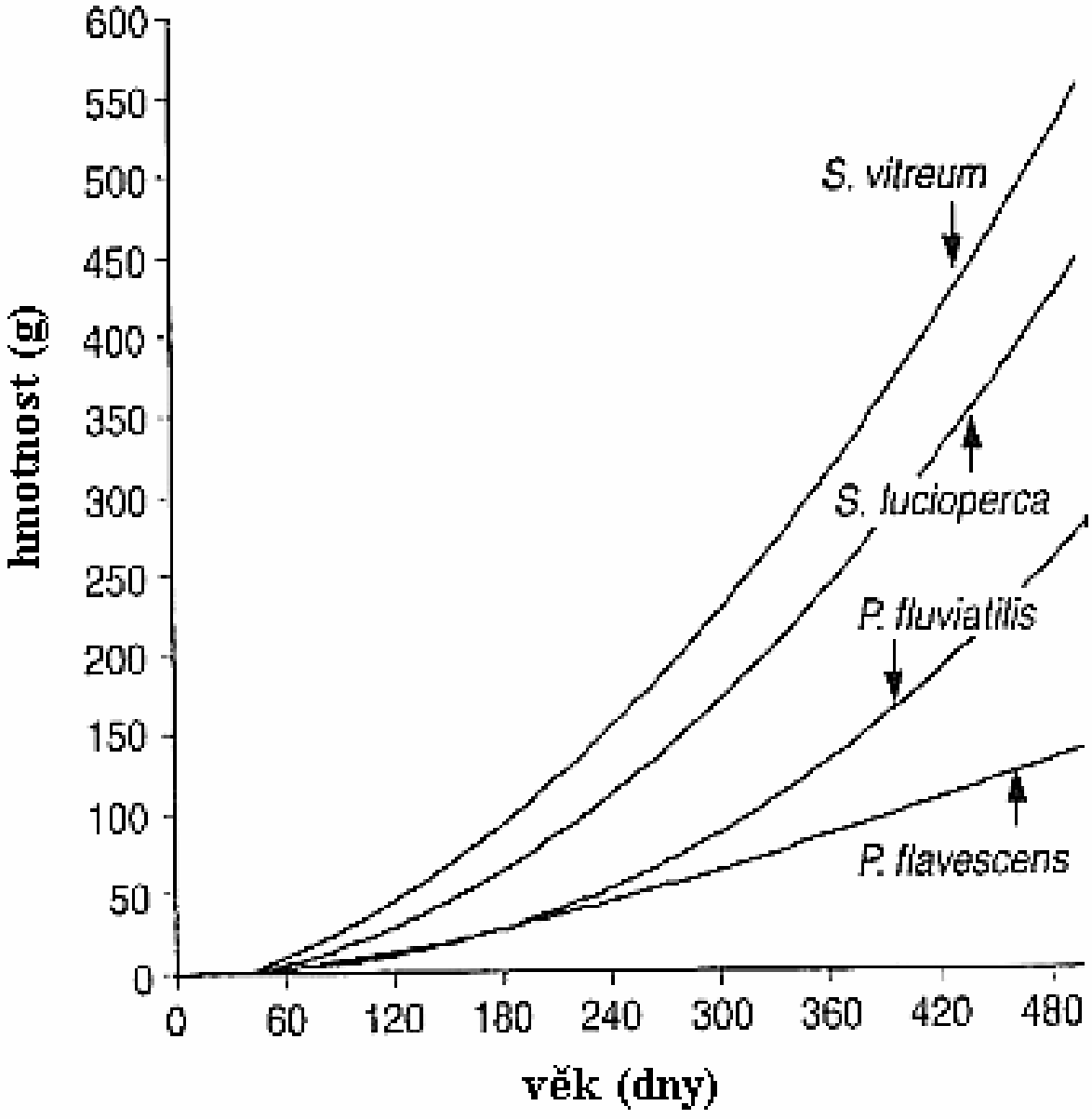
- Reproduction
- Incubation of eggs
- Rearing from larvae to commercial fish



Perca



■ = *Perca flavescens*, ▨ = *P. fluviatilis* and ⁘ = *P. schrenki*.


600
550
500
450
400
350
300
250
200
150
100
50
0
hmotnost (g)
0
60
120
180
240
300
360
420
480
věk (dny)
S. vitreum
S. lucioperca
P. fluviatilis
P. flavescens

Present state of perch culture in Czech republic

- *Czech Republic:*

Previous: it was considered as unwelcome pest fish

At present: it is using as additional species in extensive culture (in polyculture with carp (*Cyprinus carpio*)

It is using in biomanipulation for suppresion of cyprinids (*Pseudorasbora parva*)

- *Europe:*

The most impotrance market is in Switzerland (before 6000 ton of filets = 20 000 ton of perch). 90 % is import from the whole Europe

Artificial and semiartificial propagation of perch

HORMONAL PREPARATE:

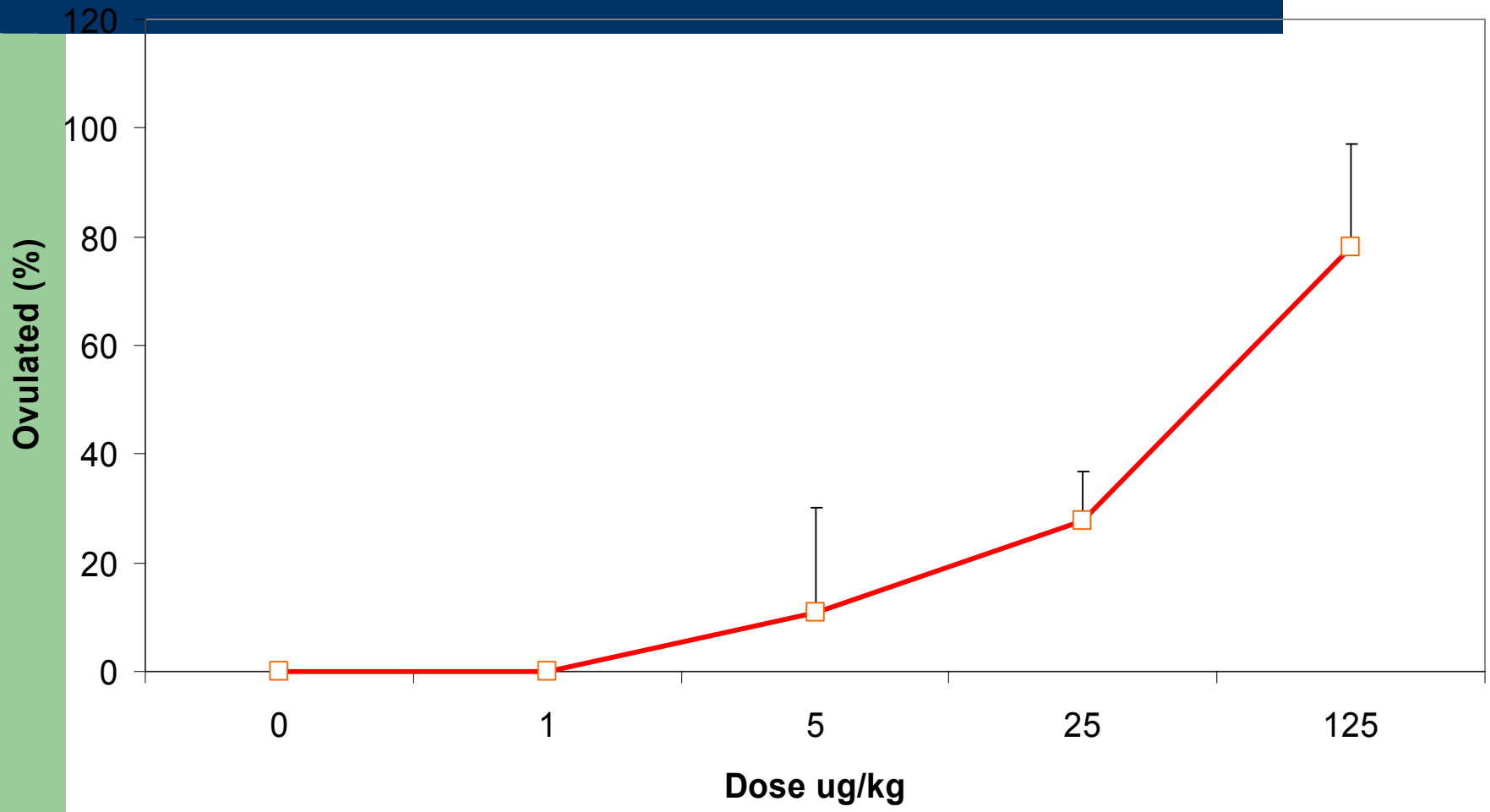
KOBARELIN
synthetic analogue of mammalian GnRH
(D-Ala6, ProNHEt9 *m*GnRH)

LECIRELIN
synthetic analogue of mammalian GnRH
(D-Tle6, ProNHEt9 *m*GnRH)

OVOPEL
synthetic analogue of mammalian GnRH
(D-Ala6, ProNHEt9 *m*GnRH)
+ dopaminergic inhibitor

DAGIN
synthetic analogue of mammalian GnRH
(D-Ala6, ProNHEt9 *m*GnRH)
+ dopaminergic inhibitor

Semiartificial propagation of perch with hormonally induced of GnRH analogue Kobarelin in temperature 15,4 °C



Semiartificiale propagation of erch with hormonally induced of GnRH analogue Kobarelin (GnRHa) in temperature 15,4 °C

Dose µg.kg-1	Stripped females egg %	Stripped mean ± SD 10^3 ind. kg^{-1}	Interval of latency time	
			D	°D
0	0			
1	0			
5	11,0 ± 19,1 a	68	3,90	60,1
25	27,6 ± 9,2 a	48 ± 19	4,30 ± 1,40	66,7 ± 22,2
125	78,0 ± 19,1 b	57 ± 31	4,38 ± 0,21	74,4 ± 2,3

ANAESTHESIA

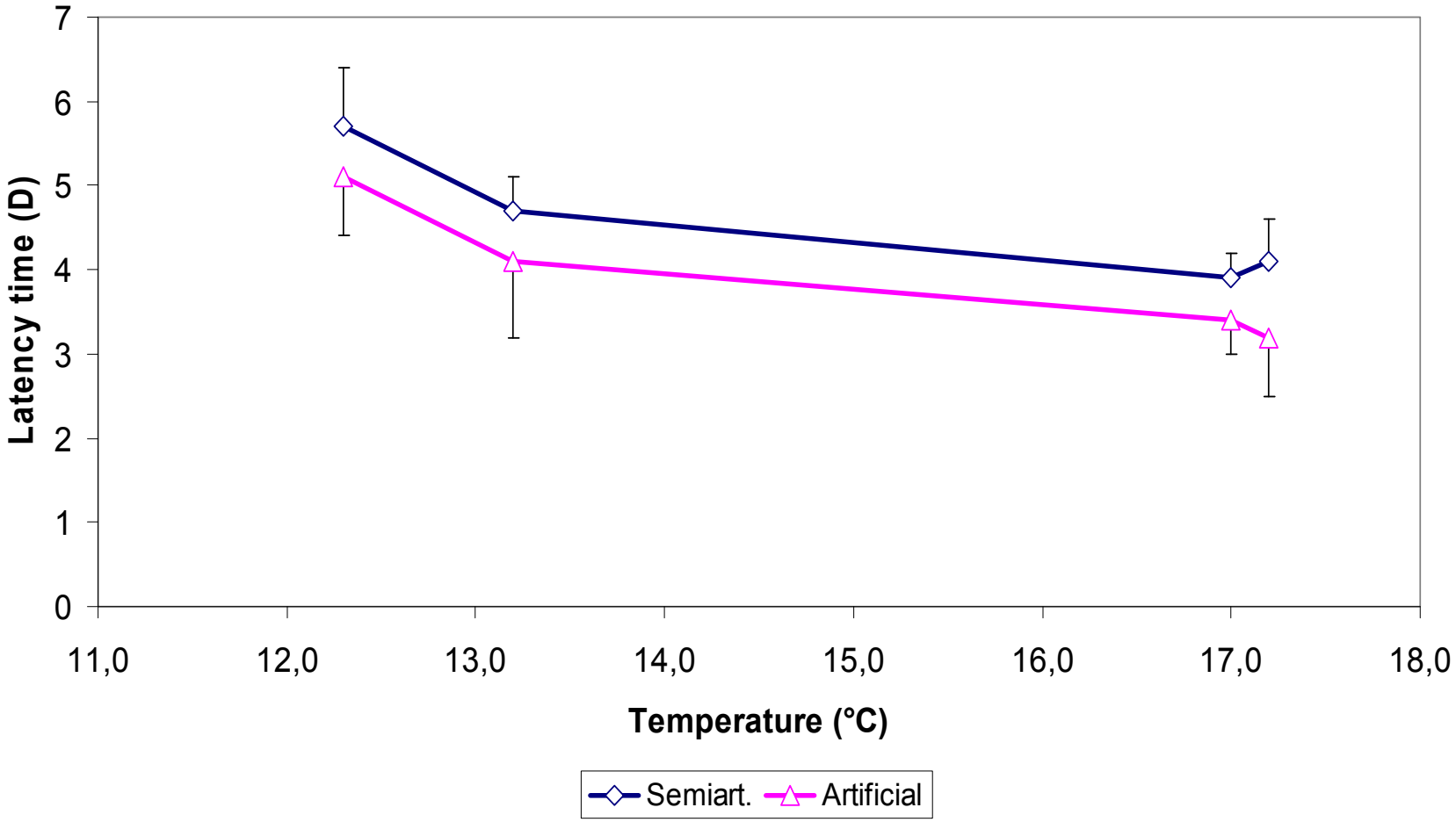
Clov oil conc. 0.03-0.04 $ml.l^{-1}$

Artificial propagation

Comparison of the results four experiments with semiartificial and artificial propagation after of single dose KOBARELIN 100 µg/kg in different temperatures

Temperature	Ovulation of females				Interval of latency time (mean)			
	semiartificial		artificial		semiartificial		artificial	
°C	injected ind.	ovul. %	injeted ind.	ovul. %	D	°D	D	°D
12.3 ± 1.6	9	78	9	67	5.7	70.1	5.1	62.7
13.2 ± 1.7	20	35	20	95	4.7	62.0	4.1	54.1
17.0 ± 1.0	7	57	7	100	3.9	66.3	3.4	57.9
17.2 ± 1.6	20	45	20	85	4.1	70.5	3.2	55.0
Mean		**53 ±16**		**86 ± 18**		**67.2**		**57.4**

Dependence on latency time of temperature



Artificiale propagation of perch females (induction of ovulation with Kobarelin, 100 µg/kg) (mean±SD)

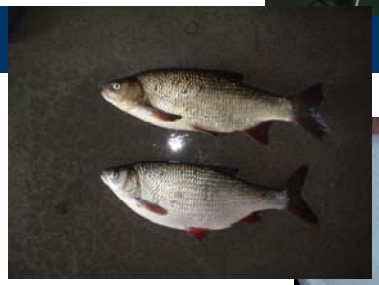
Weight of females	Females inj.	ovulated	Mean amount spawned of eggs	Interval of latency time	
g	ind.	%	10^{-3} ind.kg^{-1}	H	°H
387 ± 177	35	80	98.5 ± 38.9	106 ± 11	1715 ± 185

Minimal efective dose of LECIRELIN (SUPERGESTRAN)

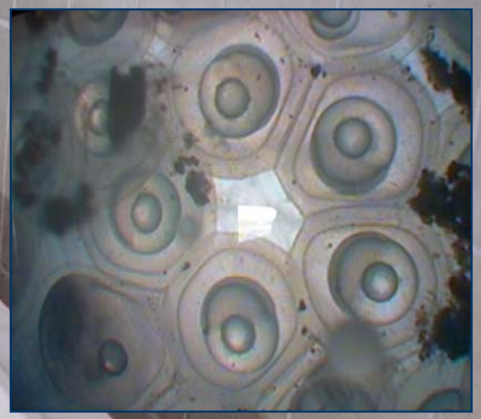
Barbel *Barbus barbus*	**100 ug/kg**	**(Kouřil at al. 2006, 2007)**
Perch *Perca fluviatilis*	**50 µg/kg**	**(Kouřil et al. 1997, 1998)**
Pikeperch *Sander lucioperca*	**20 µg/kg**	**(Kouřil and Hamáčková, 2005)**
African catfish *Clarias gariepinus*	**20 µg/kg**	**(Brzuska, Kouřil et al. 1990)**
European catfish *Silurus glanis*	**20 µg/kg**	**(Kouřil et al. unpubl.)**
Ide *Leuciscus idus*	**5 - 10 µg/kg**	**(Kouřil et al. 1990)**
Tench *Tinca tinca*	**1 – 5 µg/kg**	**(Kouřil et al. 1991)**



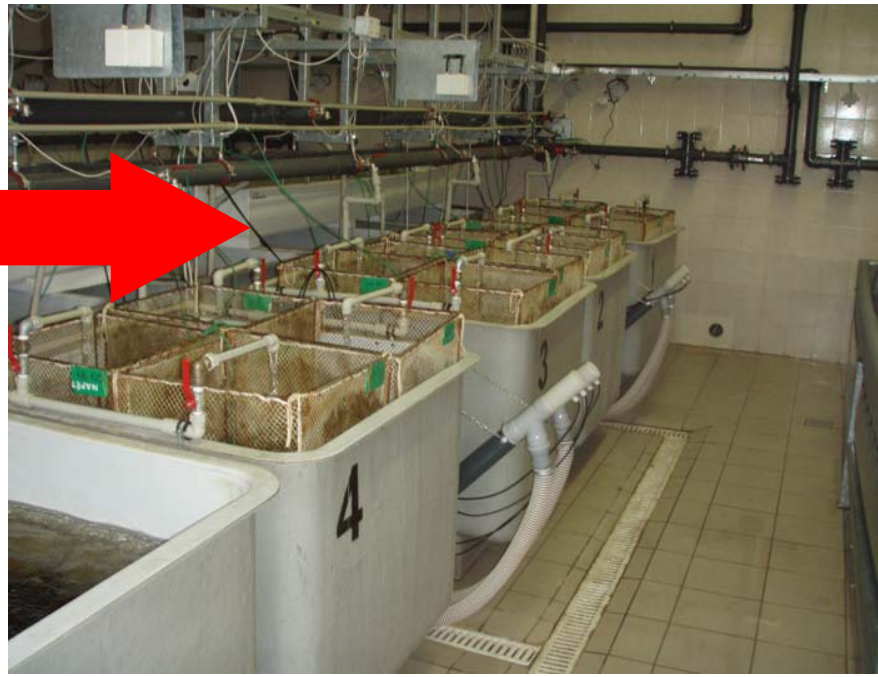





Incubation of eggs



Habituation of pond-nursed fingerlings and following rearing in recirculation system



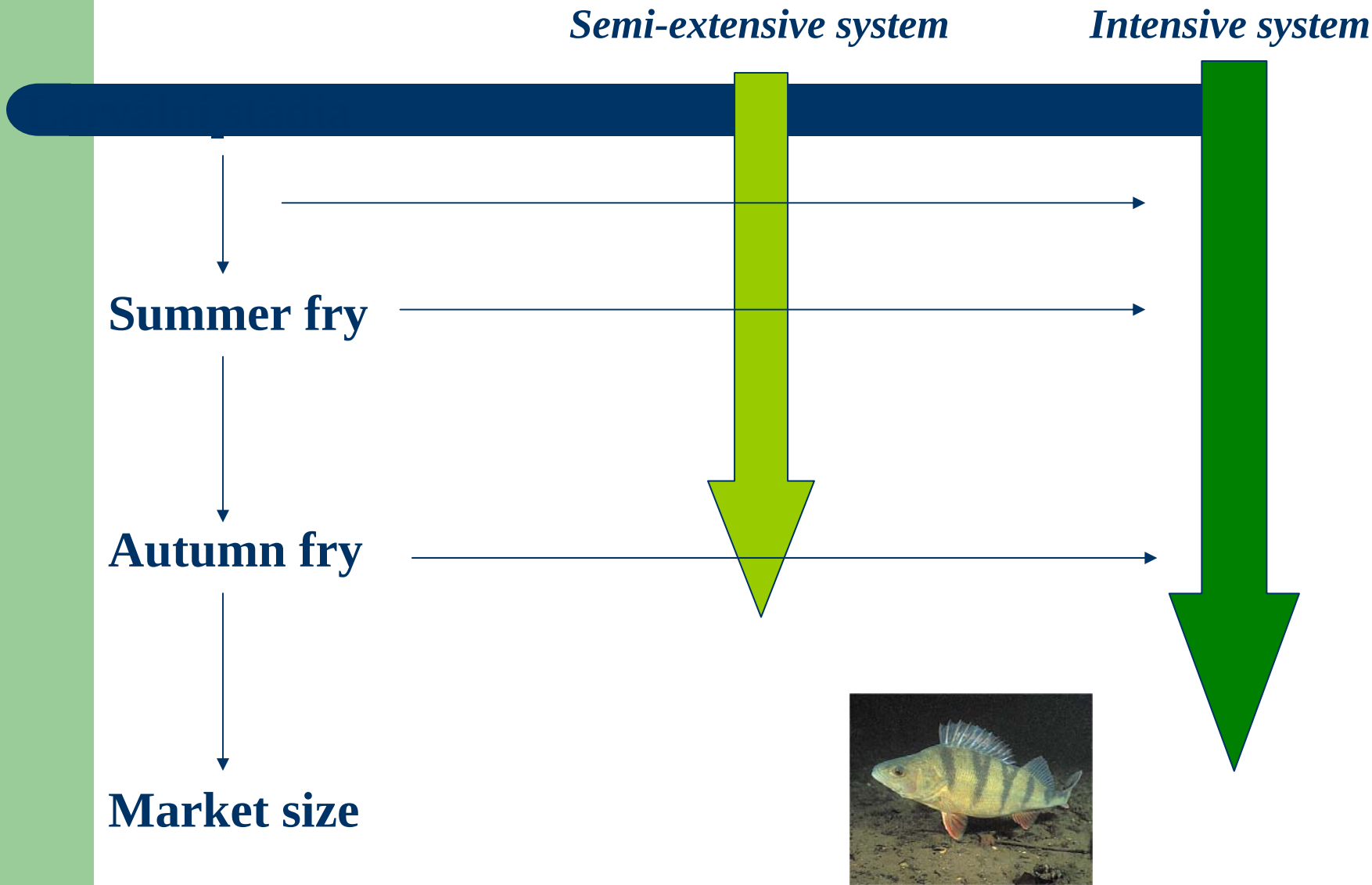
ADVANTAGES

- Lower costs and labour consumptions in rearing of early life stages
- Working with larger fingerlings (easier manipulation)
- Higher quality of fingerlings

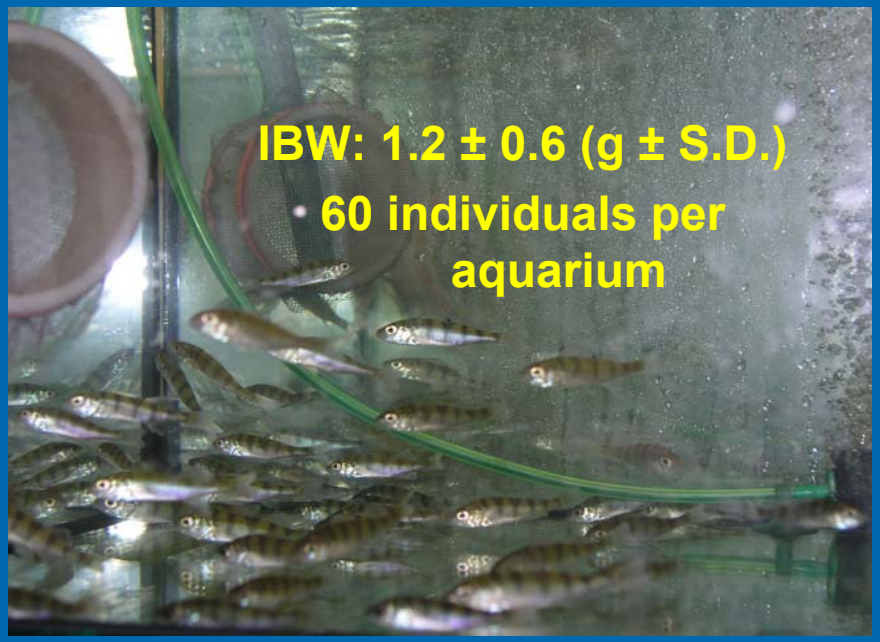
DISADVANTAGES

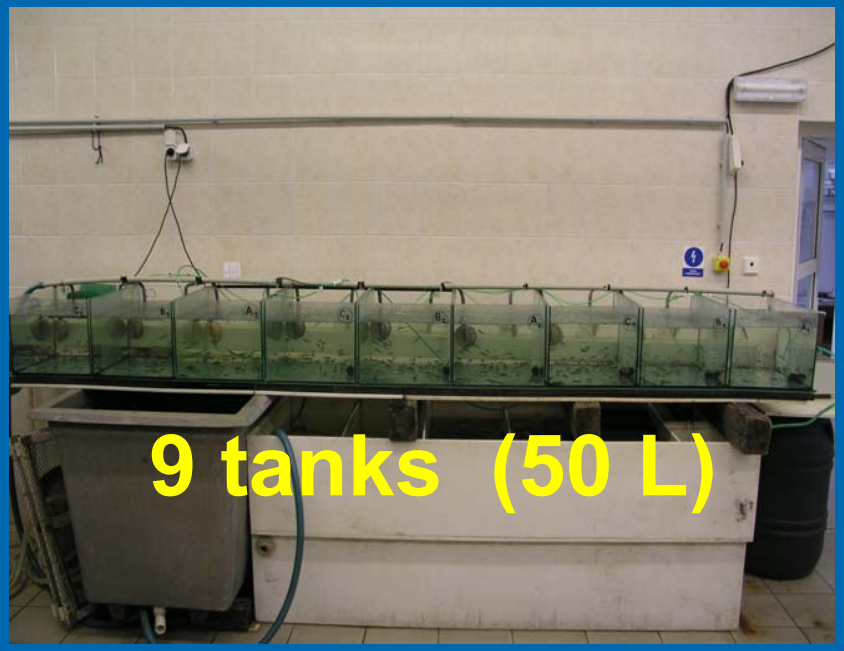
- Less control during rearing of perch in fishpond
- 1 critical point = harvest of pond
- 2 critical point = weaning period

Methods of perch culture (Ljunggren, 2002)



Using of semi-moist diets





Basal feed Dana Feed DAN-EX 1352 (vit.E. BHT) 1.5mm

Group A – fed on moistened diet with 50 % fish meat for 7 days

Group B – fed on moistened diet with 30 % potato amyloid paste for 7days

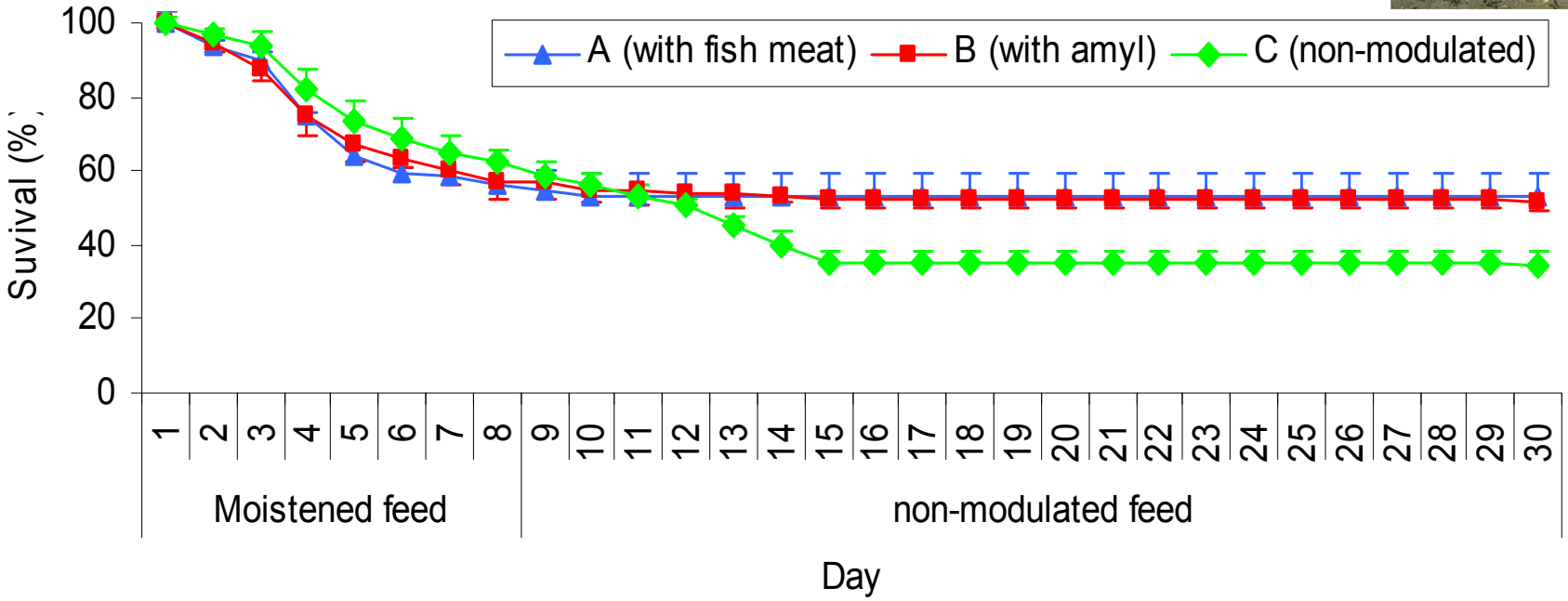
Control group C – non-modulated feed

Feeding frequency 15 meals /day after 7th day 5 meals/day

Density =1.2 individuals·L^{-1}

Biomass =1.4 g·L^{-1}

Results



Effect of diet on survival, one-way ANOVA (df = 2; F = 7.911; p = 0.020)

	A (Fish meat)	B (amyl)	C (non-modulated)
Survival (%) ± S.D	53.3 ± 5.9a	52.2 ± 2.0a	35.0 ± 3.6b

Effect of initial body weight

Pond pre-reared perch was separated acording to body weight

Biomar Bio-optimal Start (18T. 56P) with etoxyquin was used as basal diet

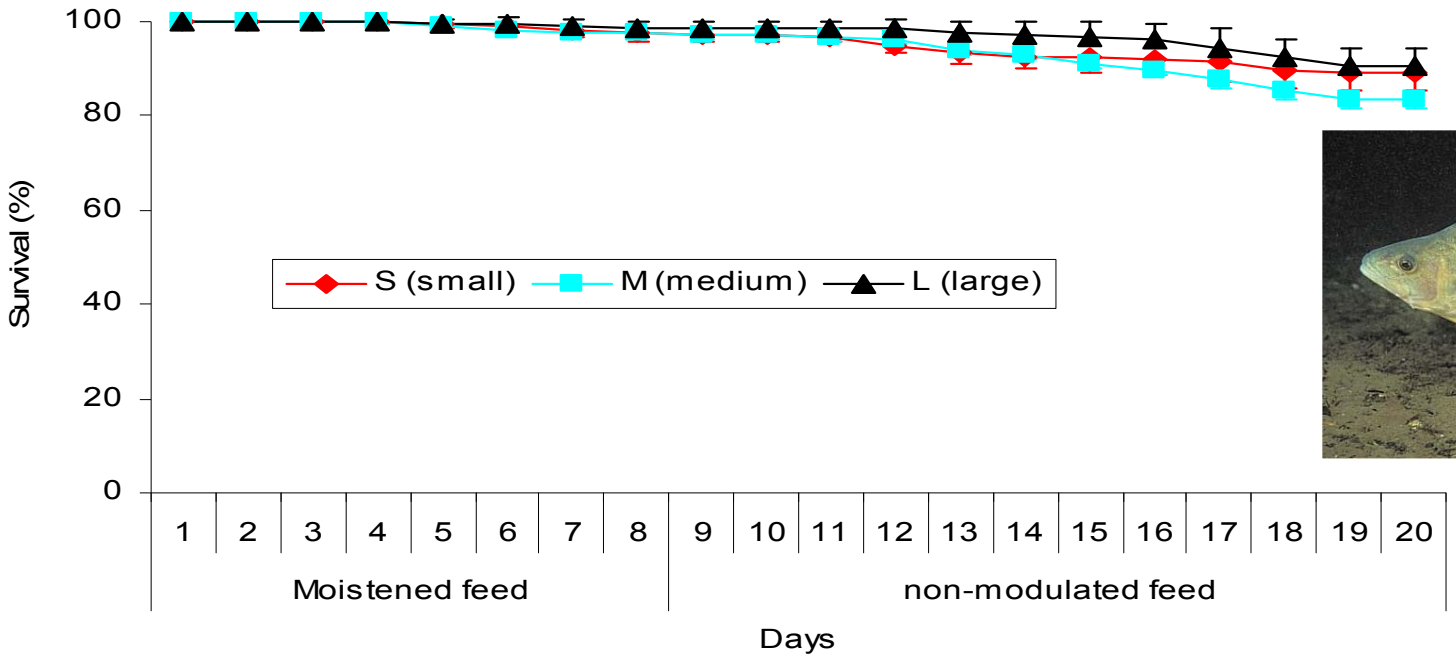
Fish was separated into three groups acording to IBW (g) 1.0 ± 0.2 g (L); 0.6 ± 0.1 (M); 0.4 ± 0.1 (S) (mean ± S.D.)

Semi-moist feed (without agglutinant) was fed for 7 days

Feeding rate was catculated acording to Fiogbé and Kestemont (2003)

Addition NaCl (0.3g · L^{-1}) into water befor use

Results



Data are presented as mean ± S.D.

	S (small)	M (medium)	L (large)
Cumulative survival (%)	89.1 ± 3.7^{a}	83.5 ± 2.0^{b}	90.3 ± 2.7^{a}
Total survival (%)	87.3 ± 1.9^{a}	79.0 ± 2.4^{b}	86.8 ± 2.0^{a}
Canibalism (%)	3.0 ± 0.8^{a}	4.5 ± 1.3^{a}	3.5 ± 0.8^{a}
Finnal weight (g)	0.70 ± 0.31	1.22 ± 0.96	1.54 ± 0.52

Habituation of autumn fingerlings

Temperture adaptation for 5 days

Density = 3.3 ind·L^{-1}, Biomass =12.1 g·L^{-1}

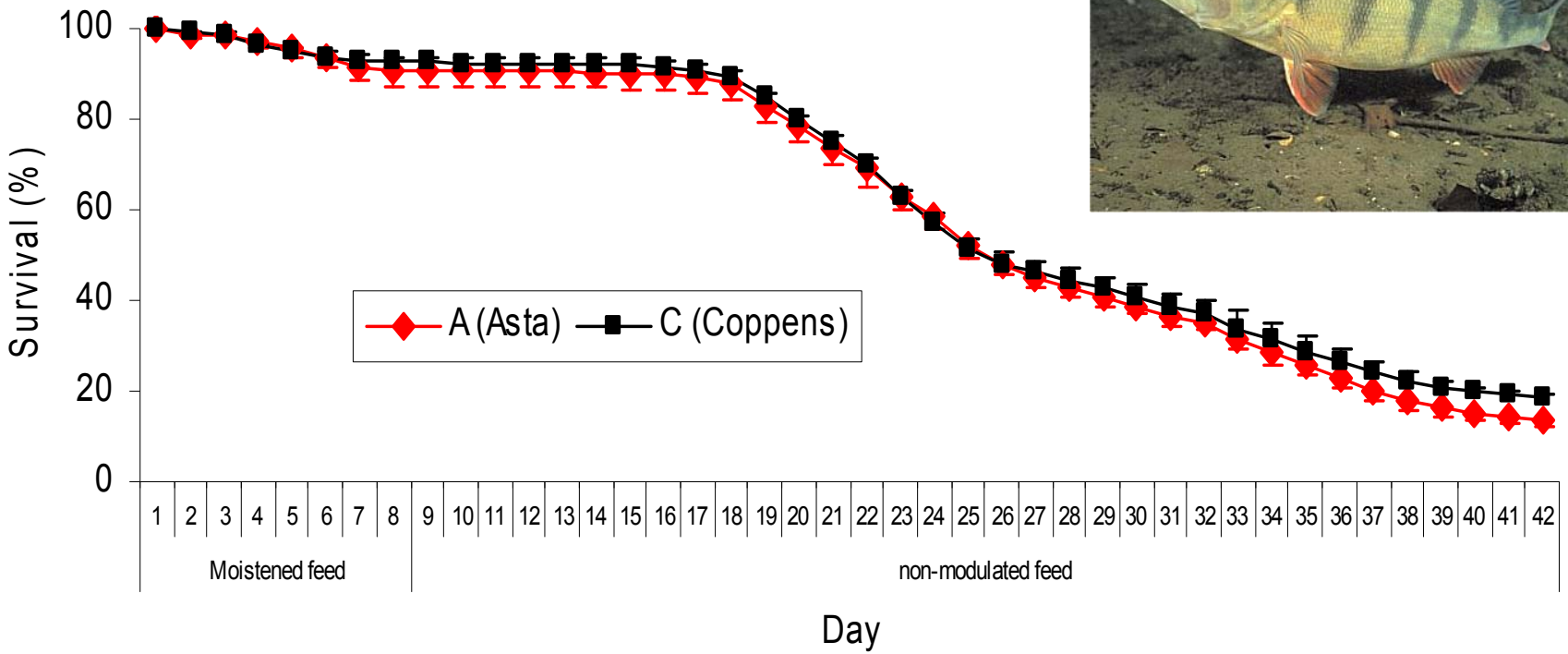
Asta (A) and Coppens Karpico Prime- 6EX (C) was used as basal feed

Semi-moist feed (50% fish meat) was prepared

Food was distributed manually every 30 minutes during the daylight period (from 07:00 to 19:00) in *ad libitum*.

After 7th experimental day. the fish was fed automatically with non-modulated feed

Results



Data are presented as mean ± S.D.

	A (Asta)	C (Coppens)	t	p
Cumulative survival (%)	12.9 ± 1.4	18.9 ± 0.5	5.15	0.006
Cannibalism (%)	1.2 ± 0.8	2.0 ± 1.2	-0.14	0.893

summer fingerlings

Experiment 1 (2005)

Basal feed Asta (A) and Biomar Ecolife 15 (B) → Semi-moist feed (50% fish meat)

Feeding frequency 16 meals/day.

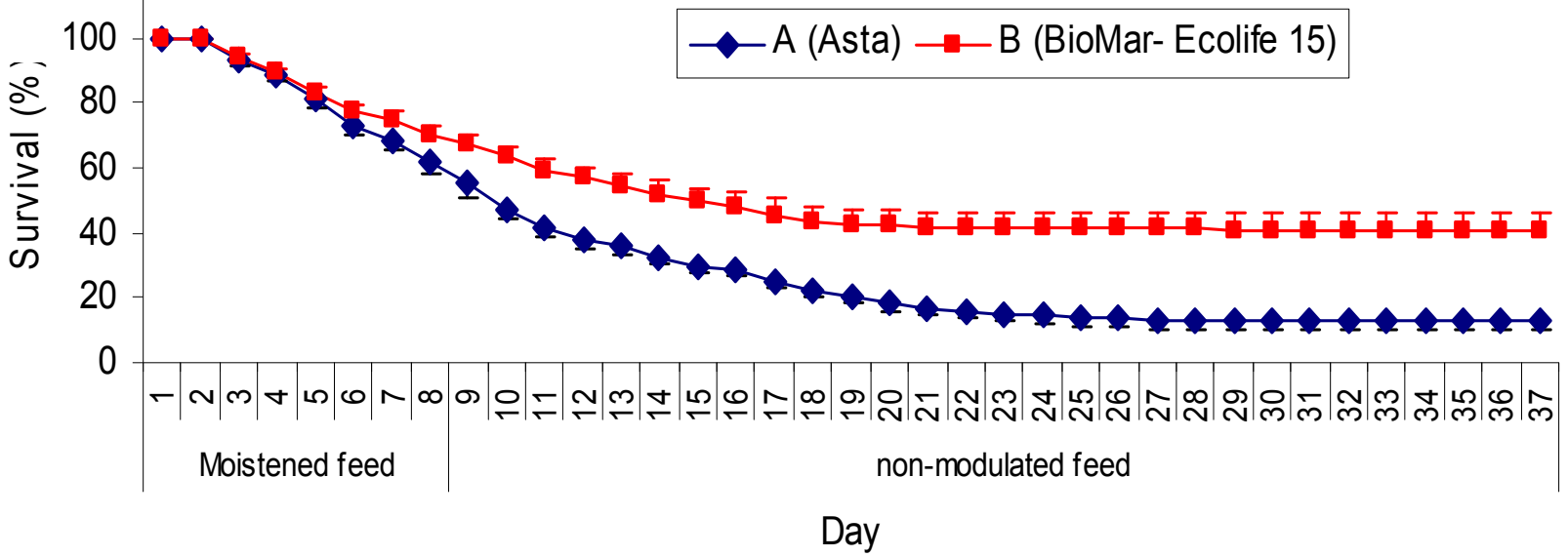
Density = 4.3 ind·L^{-1}

Experiment 2 (2006)

Biomar Bio-optimal Start (18T;56P) with **etoxyquin** as basal feed → Semi-moist feed without agglutinant

Additon of NaCl (0.3g·L^{-1}), Density = 6 ind·L^{-1}

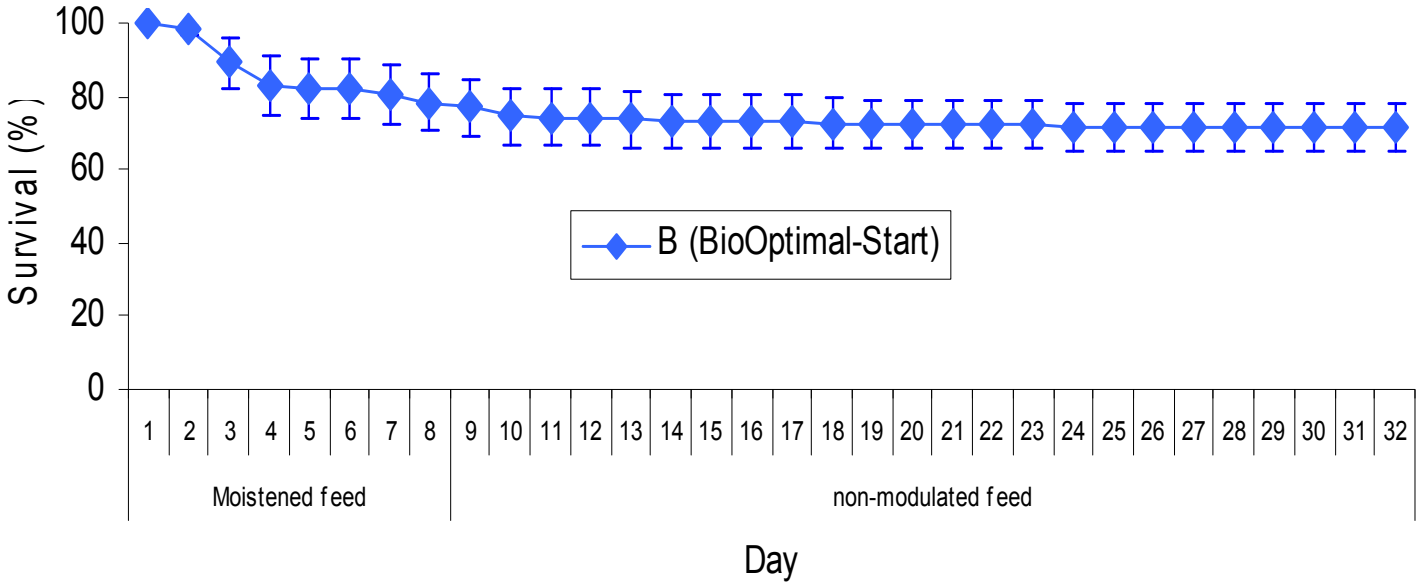
Results of experiment 1



Data are presented as mean ± S.D.

	A (Asta)	B (BioMar-Ecolife)	t	p
Cumulative survival (%)	12.9 ± 3.0	41.0 ± 4.6	7.16	0.002
Cannibalism (%)	2.7 ± 1.1	6.9 ± 2.4	-0.38	0.717

Results of experiment 2



- Cumulative survival (%) = 71.9 ± 6,4 (mean ± S.D.)

Conclusions

- Using of semi-moist mixture have significant influence on habituation succes.
- The addition of salt affected the occurence of fungi and resulted in higher survival.
- Eurasian perch is particulary sensitive to lipid peroxidation.
- Second amout of loses become after 35 – 45 days with feeding mixture without etoxyquin (Dana Feed, Asta, Coppens,). It wasn‘t occured in rearing with BioMar BioOptimal 60 which content etoxyquin.
- Any effect of body size on habituation succes in interval 0.4 ± 0.1; 0.6 ± 0.1; 1.00 ± 0.2 (g; mean ± S.D.)

Experimet:
Growth performance of all- female perch

- All female population:

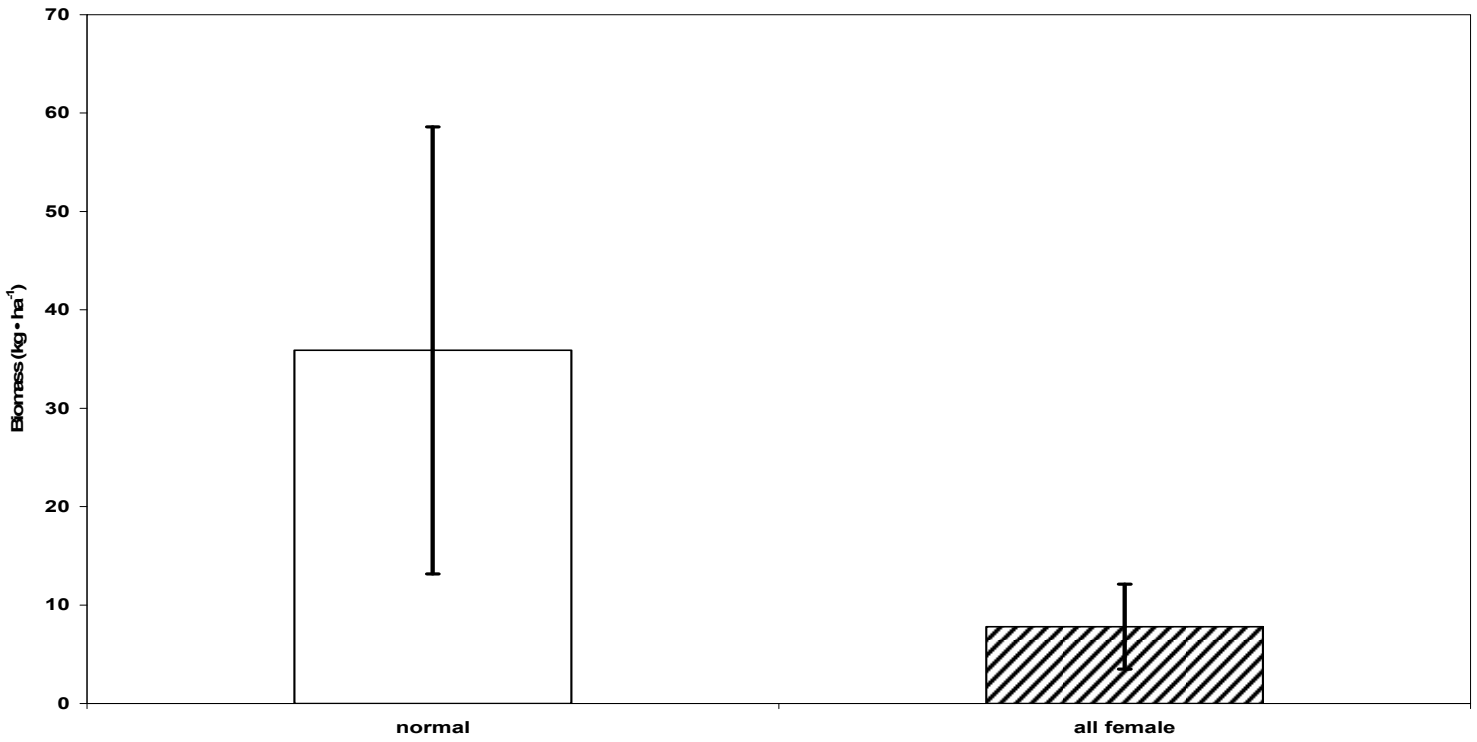
20 neomales (maskulizatio of females)

x 10 females normal population

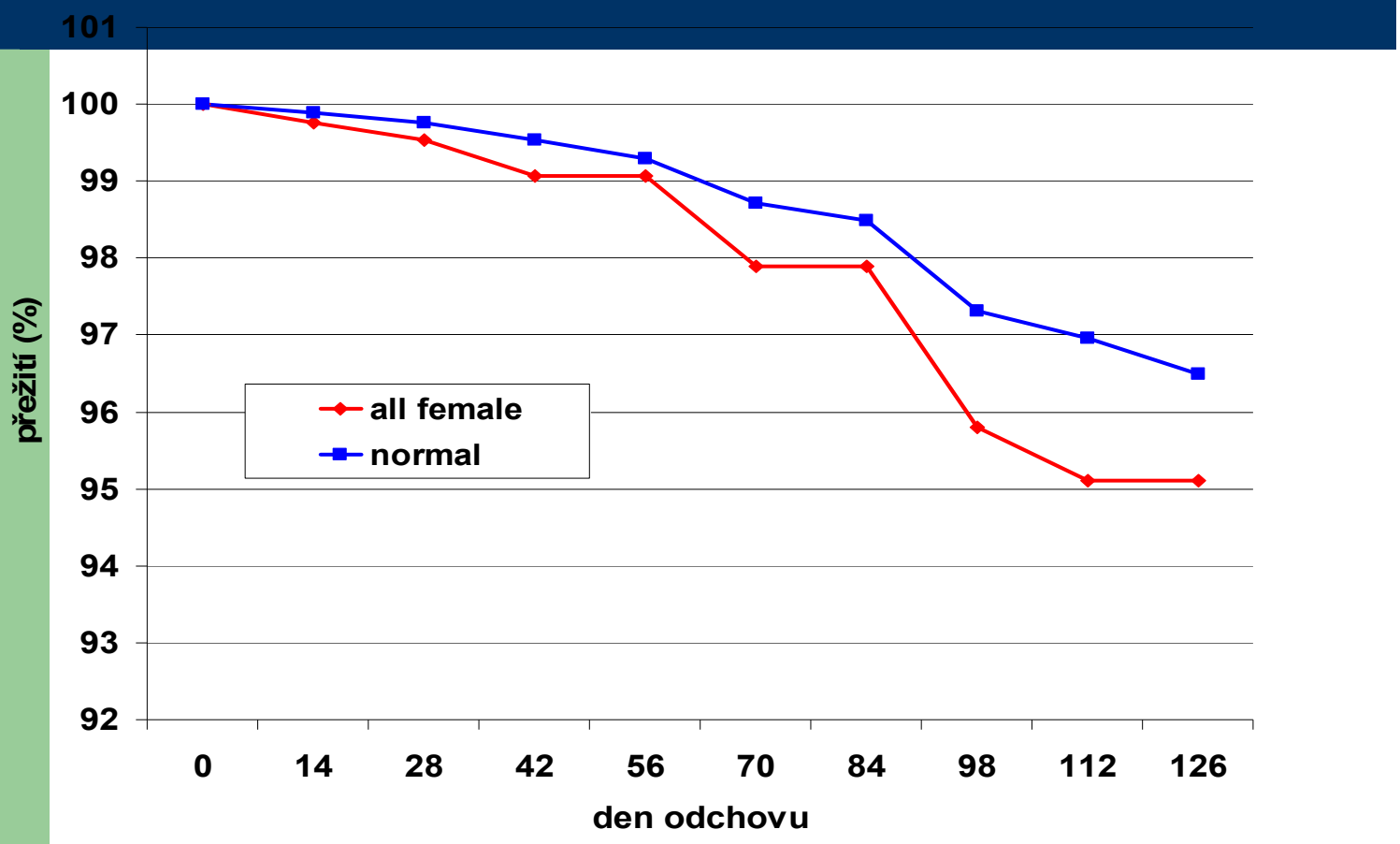
- Normal population:

15 males x 10 females (normal population)

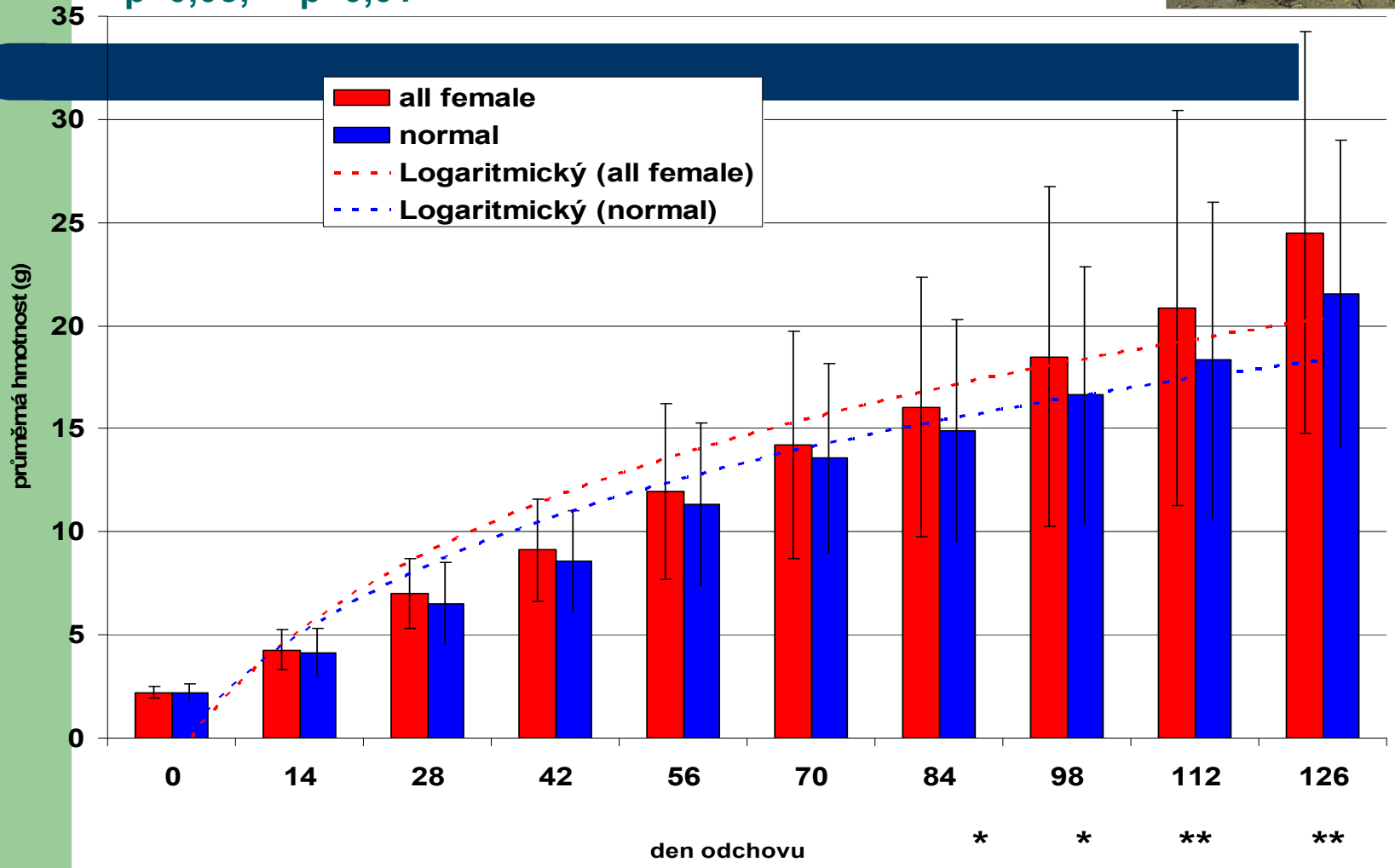
Průměrná hektarová produkce plůdku all female a normální populace



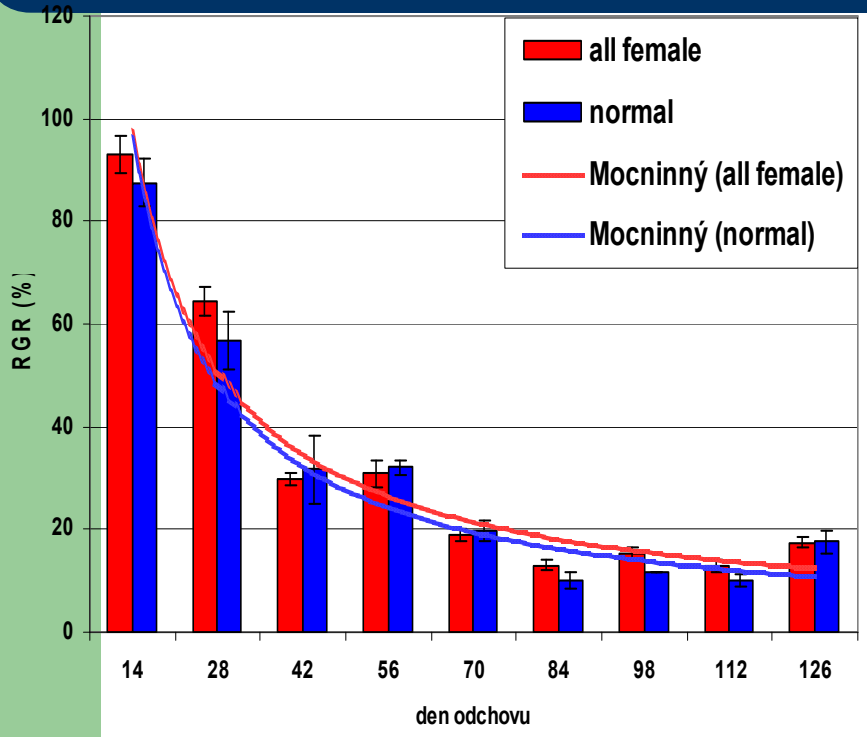
Kumulativní přežití Oř během odchovu

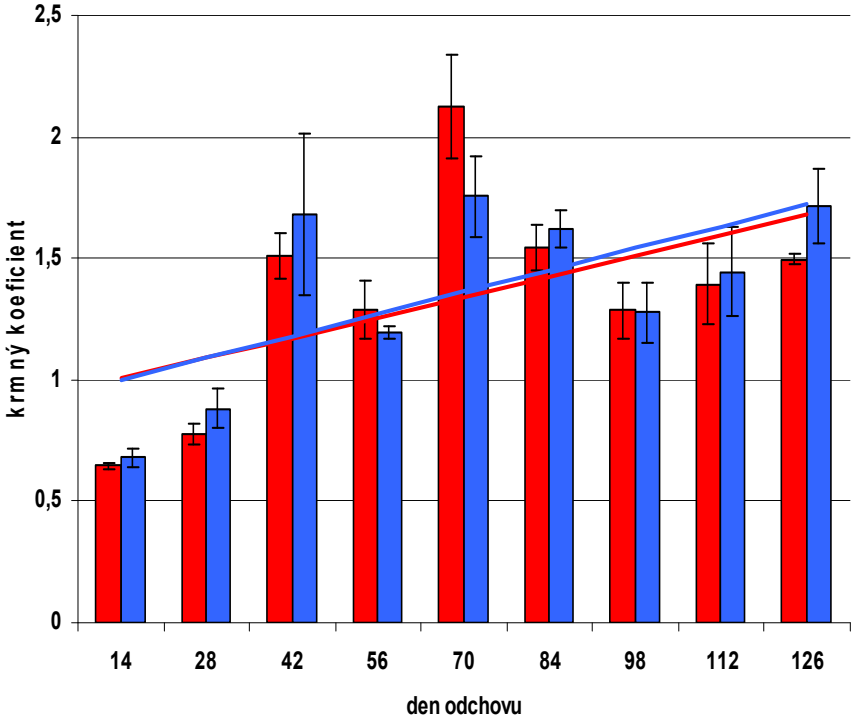


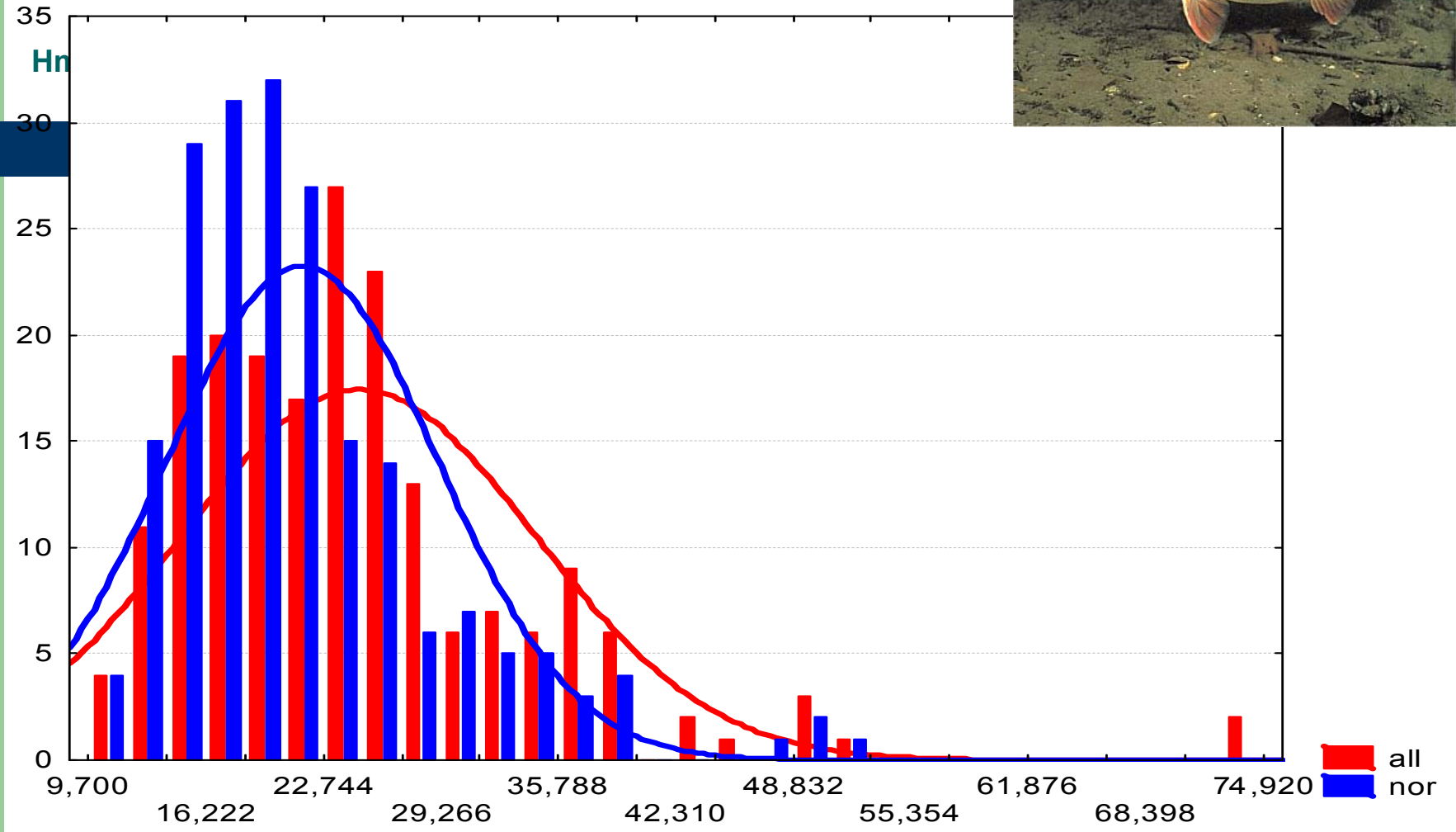
Hmotnostní růst all female a normální populace
* p=0,05; ** p=0,01



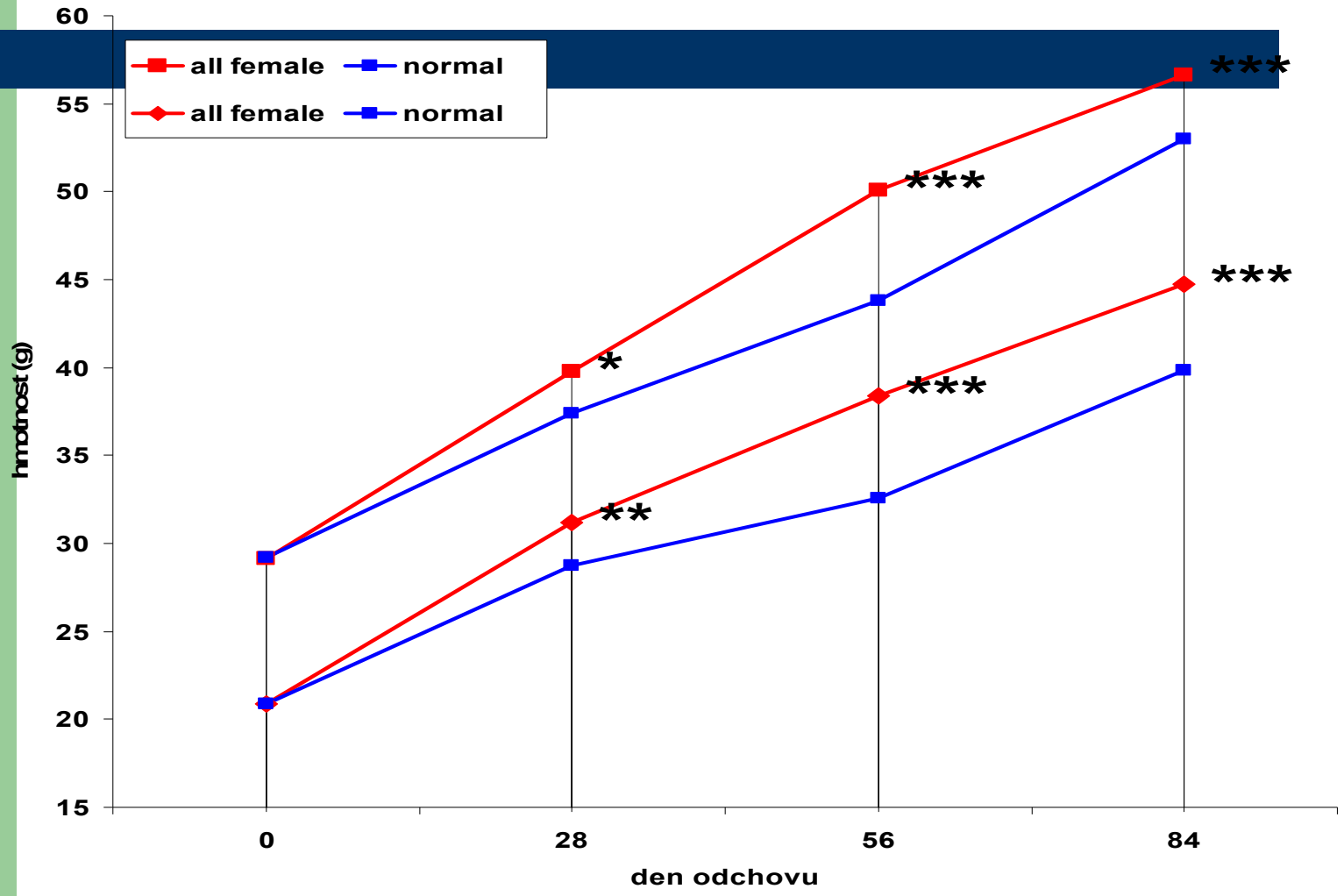
Relativní rychlost růstu a krmný koeficient v průběhu odchovu

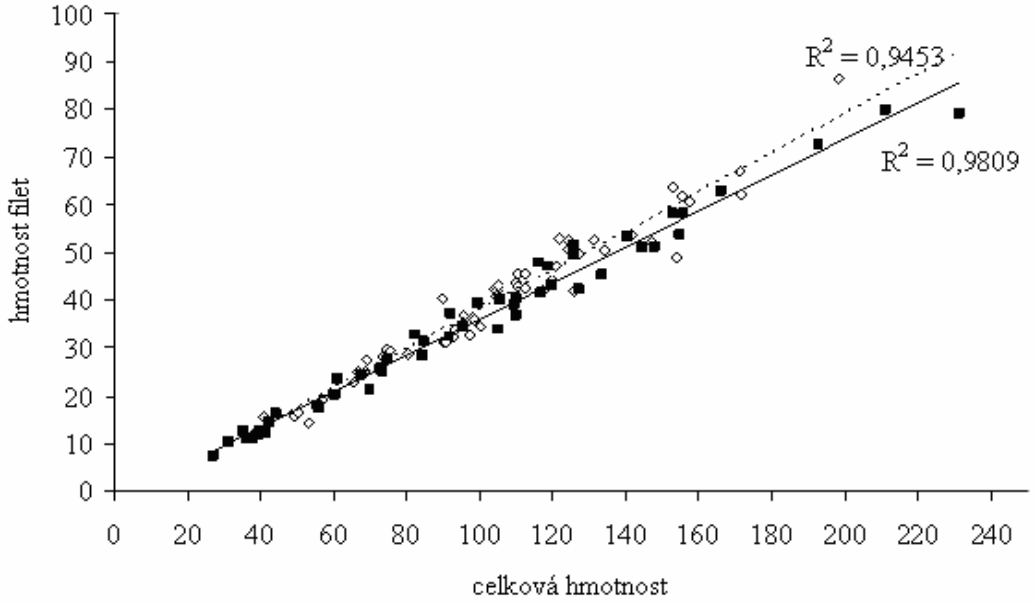





Počet pozorování
35
30
25
20
15
10
5
0
9,700
16,222
22,744
29,266
35,788
42,310
48,832
55,354
61,876
68,398
74,920
all
nor

Hmotnostní růst 2 velikostí all female a normal populace
* p=0,05; **p=0,01; ***p=0,001





Obr. 6. Vztah mezi hmotností filetů a celkovou hmotností těla u obou skupin (M,B)

Other results

- Sensitivity of clov oil to perch
- Effects of four fish anaesthetics on biochemical blood profile of perch
- Size-related oxygen consumption and ammonia excretion of perch
- Intensive culture of perch in recirculating systems
- Toxicity of ammonium to perch
- Pathology of intensive rearing of perch
- Quality of perch flesh from extensive pond culture and intensive recirculation systém
- NEXT…

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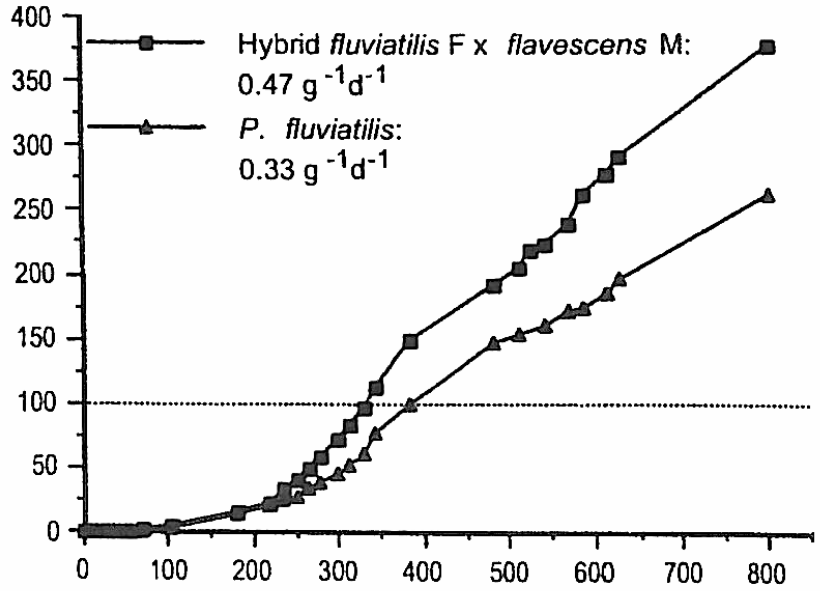
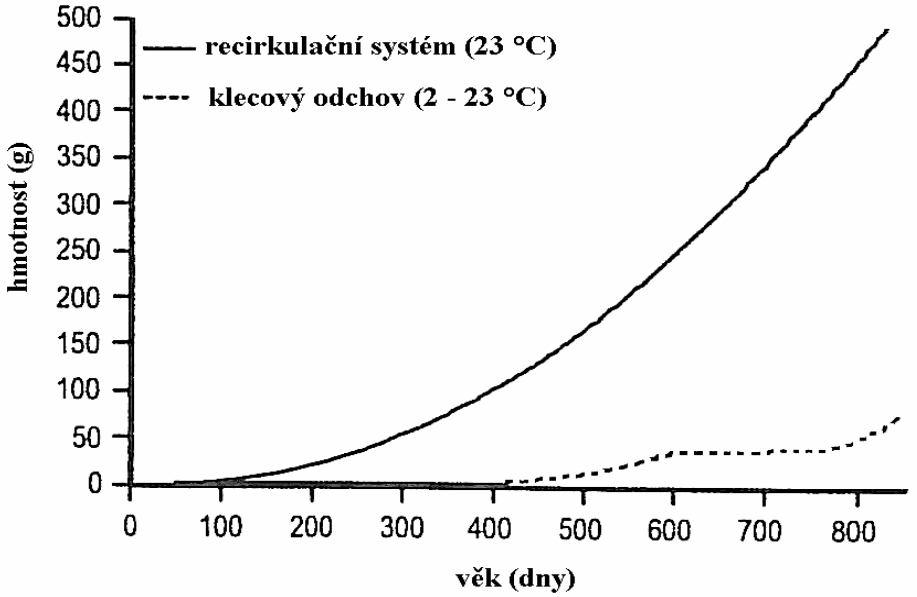
5

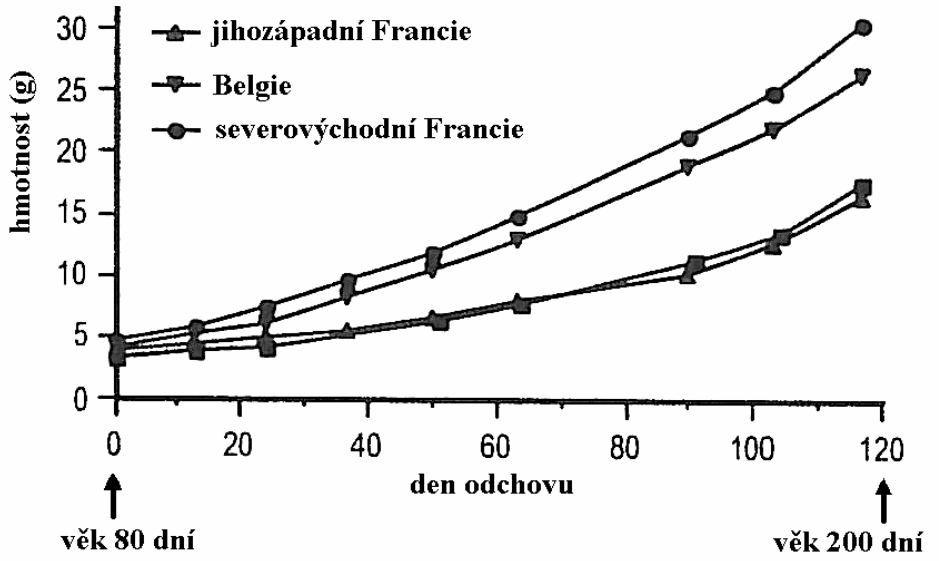
- Holandsko: Excellence Fish (100 t)

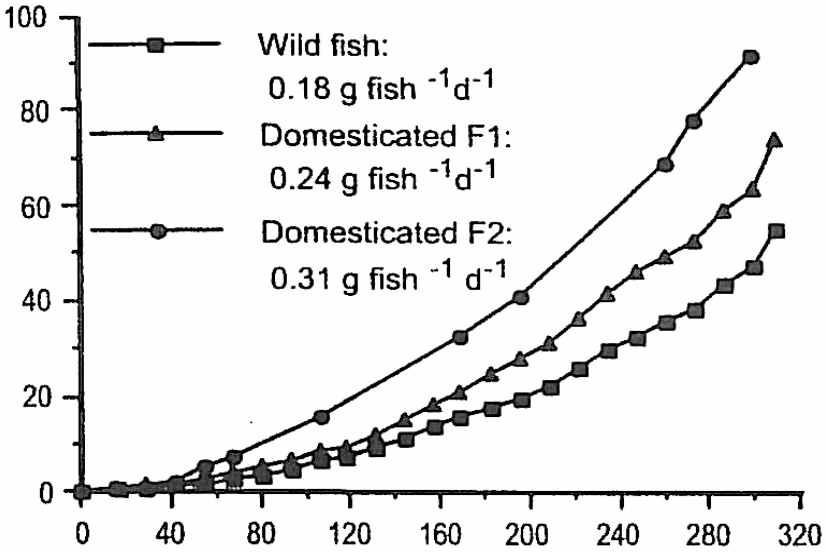
- Irsko: Clune Fisheries Ltd. (100 t)

Možnosti zvýšení růstu okouna podle Kestemonta a kol., 1999









THANK YOU FOR YOUR ATTENTION
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