



MEZINÁRODNÍ TESTOVÁNÍ DRŮBEŽE
státní podnik. ÚSTRAŠICE

390 02 Tábor 2

Tel.: 381 200 320

**XXXI. International performance test
of commercial layers
- cage system**

**The final report
2022 - 2023**

Study Investigator: Ing. Fara Jiří
Ing. Krekulová Markéta

Ústrašice. November 2023

1 The list of participants

Sam.	Cross	Hatchery flock	State	Breeding organization
1	XXXXX	XXXXX	XXXXX	XXXXX
2	XXXXX	XXXXX	XXXXX	XXXXX
3	XXXXX	XXXXX	XXXXX	XXXXX
4	XXXXX	XXXXX	XXXXX	XXXXX
5	XXXXX	XXXXX	XXXXX	XXXXX
6	XXXXX	XXXXX	XXXXX	XXXXX
7	XXXXX	XXXXX	XXXXX	XXXXX
8	XXXXX	XXXXX	XXXXX	XXXXX
9	XXXXX	XXXXX	XXXXX	XXXXX
10	XXXXX	XXXXX	XXXXX	XXXXX

2 The basic data of performance test

2.1 Progeny testing

The progeny testing of commercial layers hybrids consists of:

- incubation and hatch of delivered hatching eggs from a regular PS flock
- pullets rearing: 18 weeks long rearing period (126 days)
- hen production: 56 weeks long laying period (127 – 518 days of age)

2.2 Location of the test

Mezinárodní testování drůbeže. s.p. Ústrašice – Testační stanice nosných slepic (Test Station of Layers)

2.3 Material

There were 10 genotypes compared in the test. Each sample consisted of 1080 hatching eggs delivered to the test station.

2.4 Important dates

setting in the hatchery:	15 March 2022
beginning of rearing – day 1:	6 April 2022
end of rearing:	9 August 2022
beginning of laying. start of the period 1:	10 August 2022
end of laying. end of the period 14:	5 September 2023

3 Incubation and hatching

3.1 Sorting and weighing of hatching eggs

The hatching eggs were sorted immediately after delivery to the test station. The average egg weight of each sample was found.

3.2 Storage of hatching eggs

After sorting and weighing. the hatching eggs were disinfected and stored in temperature of 16 – 18 °C.

3.3 Setting in the hatchery

Hatching eggs of all samples were set for a single stage incubation at once. Correspondent data monitoring was made during incubation.

4 Rearing of pullets

4.1 Samples and their location

The rearing of pullets took 126 days. Day old chicks were sexed. The males were destroyed. After culling of non standard birds, 270 pullets of each sample were randomly chosen for the test. 90 pullets were placed in the house with deep litter system and 180 pullets in the cage system.

Pullets were marked (wing banded). Beak trimming was carried out by hot blade. This treatment was done on a half of pullets reared in the cage system and on all pullets reared in the deep litter system. A half of pullets reared in the cage system is not beak-trimmed.

4.2 Housing system

Pullets were kept in windowless house with full control of the environment. Pullets in cage system were kept in 3-tier cage batteries. Feed was manually filled in the feeders. Nipple automatic drinkers were used. Belt conveyer for clearance of excrements. Manually filled tube feeders and nipple automatic drinkers were used in deep litter system.

4.3 Conditions of the environment

Temperature

Age	Deep litter system		Cage system
	below the heater °C	in the house °C	in the house °C
Day 1 - 3	36	27	36
Day 4 - 7	33	27	33
Day 8 - 14	30	24	30
Day 15 - 21	27	24	27
Day 22 - 28	24	22	24
Day 29 - 35	-	20	20
From week 6	-	18-20	18 – 20

Stocking density

Age	Deep litter system	Cage system
Day 1 - 112	9 birds/m ²	350 cm ² /bird
From day 112	756 cm ² /ks	

Ventilation

Transversal automatically controlled ventilation (fans and air inlets on the opposite side of the house) was used. Ventilation provided minimum ventilation rate of 3 m³/hour/kg live weight in winter, with possible increase in summer, depending on temperature and air humidity. Relative humidity was kept between 50 – 70 %.

4.4 Lighting programme

Pullets were kept in windowless house. All the birds were submitted to the following lighting programme.

Lighting programme:

Age	Hours of light	From - to	Luminous intensity (lx)
Day 1 - 3	23	1 ⁰⁰ – 24 ⁰⁰	40
Day 4 - 7	20	2 ⁰⁰ – 22 ⁰⁰	30
Day 8 - 14	18	3 ⁰⁰ – 21 ⁰⁰	20
Day 15 - 21	16	4 ⁰⁰ – 20 ⁰⁰	10
Day 22 - 28	14	5 ⁰⁰ – 19 ⁰⁰	10
Day 29 - 35	12	6 ⁰⁰ – 18 ⁰⁰	5 – 10
Week 6 - 16	10	6 ⁰⁰ – 16 ⁰⁰	5 – 10
Week 17	12	6 ⁰⁰ – 18 ⁰⁰	5 – 10
Week 18	13	5 ⁰⁰ – 18 ⁰⁰	5 – 10

4.5 Feeding and watering

Pullets were fed to reach their BW standards during rearing. The complete feed mixture was filled daily in the tube feeders in deep litter system and in groove feeders in cage system. The feed K1 is distributed several times a day. The feeds K2, KZK and N0 are distributed twice a day – 50% in the morning and 50% in the afternoon. All the distributed feed should be daily eaten. Water was supplied by automatic nipple drinkers. Feed was supplied by xxxxx

We were solving problem on start of rearing with quality of starter = feed K1. After detecting a lower consumption of feed, lower BW and worse health condition of the chickens and consultation with vet and manager of feed mill, there was given a new batch of K1 feed after fourteen days of the animals' age.

Diet formulas:

	K1 IT N	K2 IT N	KZK IT N	N0
Age	Week 1 - 4	Week 5 - 10	Week 11 - 16	Week 17 - 18
Feed form	crumbled	crushed	crushed	crushed
Components – content in %:				
Wheat	51.00	52.78	58.49	51.26
Maize	15.00	16.00	10.00	15.00
Extr. soybean groats	23.85	19.30	9.00	16.35
Extr. rapeseed groats	1.50	2.00	3.00	3.00
Extr. sunflower groats	1.50	2.00	2.90	2.50
Wheat bran	-	2.50	12.20	2.30
Fish meal	1.50	0.70	-	-
Soybean oil	1.56	0.92	0.88	0.30
Animal fat	-	-	-	1.82
Lysine-HCl	0.29	0.22	0.20	0.13
L-threonine	0.07	0.03	-	-
DL-methionine	0.23	0.17	0.08	0.15
Sodium sulfate	0.15	0.13	0.12	0.17
Salt	0.26	0.27	0.27	0.24
Limestone	1.97	1.95	2.15	3.53
Limestone-roughly ground	-	-	-	2.00
MCP – monocalciumphosphate	0.85	0.75	0.42	0.80
Vitamin and mineral supplement	0.27	0.28	0.29	0.45
Nutrient content (calculated values):				
CP (g/kg)	203.10	186.00	155.90	169.10
Fat (g/kg)	36.00	29.60	28.30	40.00
Linoleic acid (g/kg)	16.00	13.00	12.50	11.00
Crude fiber (g/kg)	29.80	32.80	42.00	33.10
ME enz. (MJ/kg)	12.30	12.10	11.80	11.50
Lysine (g/kg)	11.41	9.75	7.28	8.26
Methionine (g/kg)	5.15	4.39	3.21	3.96
Met. + Cys. (g/kg)	8.67	7.77	6.31	7.13
Threonine (g/kg)	7.90	6.82	5.23	5.91
Tryptophan (g/kg)	2.42	2.21	1.88	2.02
Ca phytase (g/kg)	12.00	11.50	11.50	24.50
P (g/kg)	6.20	6.00	5.90	5.90
P digest. (g/kg)	4.80	4.50	3.80	4.40
Vitamin A (IU/kg)	10 000.00	10 000.00	10 000.00	10 000.00
Vitamin D3 (IU/kg)	3 000.00	3 000.00	3 000.00	3 000.00

4.6 Veterinary precautions

House was cleaned, washed and disinfected with xxxxx before the pullets` placement. Disinfection of shoes with xxxxx solution at house entry was used. Rodent control was provided regularly.

Vaccination programme

Age	Disease
Day 1	Marek`s disease + infectious bronchitis
Day 3	Salmonellosis
Day 7	Coccidiosis
Day 10	E.coli
Day 13	Infectious bronchitis
Day 17	Newcastle disease
	Gumboro disease
Week 3	Salmonellosis
Week 4	Gumboro disease
Week 6	Infectious bronchitis
	Newcastle disease
Week 9	Infectious bronchitis
Week 10	Avian pneumovirus
Week 11	Avian encephalomyelitis
Week 12	Infectious bronchitis
Week 13	Salmonellosis
Week 14	E.coli
Week 16	Infectious bronchitis
	Newcastle disease
	Egg-drop syndrome

4.7 Transfer to the laying house

Pullets were moved to the laying house at the age of 16 weeks (112 days). 180 birds per sample were selected according to their live weight.

Pullets were placed in cage batteries in 6 replications per sample. All samples were kept in coincident environment conditions.

5 Production period

5.1 Samples and their placement

Hens were placed in cage batteries in 6 replications per sample. All samples were kept in coincident environment conditions.

5.2 Housing system

Hens were kept in windowless house with full control of the environment. They were kept in 3-tier enriched cage batteries.

Enriched cages provided 756 cm² of floor space per hen. Enriched cages were equipped with a perch, a nest, a roosting ash place and claw shortening devices in addition to feeders and drinkers.

Feed was manually filled in the feeders, water was supplied by automatic nipple drinkers. Droppings were removed by the conveyor belt. Eggs were collected manually, each sample separately.

5.3 Conditions of the environment

Temperature was kept between 18 – 20°C. Relative humidity was 60 – 70 %. Temperature was regulated by transversal automatically controlled ventilation (fans and air inlets on the opposite side of the house), in cold weather a gas heater was used. Ventilation provided minimum ventilation rate of 3 m³/hour/kg live weight in winter and 5 m³/hour/kg live weight in summer.

5.4 Lighting programme

Hens were kept in windowless house. All the birds were submitted to the following lighting programme.

Age	Hours of light
Week 19	14
Week 20	15
Week 21	15.5
Week 22 – end of the test	16

Luminous intensity 15 – 20 lx.

5.5 Feeding

Hens were fed with three types of feed: from 19th week of age N1 start, from 23th week of age N1 and from 47th week of age N2. Complete feeds were in mash form and fed ad libitum.

Feed was supplied by xxxxx.

Diet formulas

		N1 IT N start	N1 IT N	N2 IT N
Age		19 th -22 th week	23 th -46 th week	47 th -74 th week
Feed form		crushed	crushed	crushed
Components – content in %:				
Wheat		35.08	42.71	45.28
Extr. soybean groats		16.20	11.75	11.25
Maize		20.60	18.10	15.00
Rape extr. goat		5.00	5.00	5.00
Sunflower extr. goat		7.10	7.30	7.40
Animal fat		2.35	1.25	3.34
Soybean oil		2.50	2.72	1.10
Salt		0.28	0.28	0.28
Limestone		2.82	2.88	3.09
Limestone-roughly ground		6.60	6.60	7.00
MCP - monocalciumphosphate		0.55	0.47	0.33
Premix of vitamins, enzymes		0.45	0.45	0.45
Nutrient content (calculated values):				
Crude protein	g/kg	174.00	160.98	159.10
Fat	g/kg	67.14	58.03	61.86
Linoleic acid	g/kg	23.02	22.98	15.97
Crude fiber	g/kg	39.99	39.95	39.93
ME	MJ/kg	11.45	11.40	11.40
Lysine	g/kg	7.43	6.89	6.77
Methionine dig.	g/kg	4.08	3.68	3.56
Meth. +cysteine dig	g/kg	6.73	6.21	6.07
Threonine dig.	g/kg	5.27	4.76	4.68
Tryptophan dig.	g/kg	1.76	1.61	1.59
Ca	g/kg	37.00	37.00	38.99
P	g/kg	5.38	5.12	4.78
P (digestible)	g/kg	3.91	3.70	3.41
Vitamin A	U.I./kg	10 000.00	10 000.00	10 000.00
Vitamin D3	U.I./kg	3 000.00	3 000.00	3 000.00

6 Evaluated parameters

6.1 Incubation and hatching

- weight of hatching eggs
- fertility in %
- hatchability of set eggs in %
- hatchability of fertile eggs in %

6.2 Feed consumption

- per 1 reared pullet
- per 1 hen in production period
- per 1 egg
- per 1 kg of egg mass
- per 1 feeding day

6.3 Live body weight

- at the age of 1 day – group weighing
- at the age of 14 days (2 week), 28 days (4 week), 42 days (6 week), 56 days (8 week), 70 days (10 week), 84 days (12 week), 98 days (14 week) – individual weighing
- at the age of 112 days (16 weeks) – individual weighing all birds
- at the age of 126 days (18 weeks), 140 days (20 weeks), 154 days (22 weeks), 168 days (24 weeks), 182 days (26 weeks), 196 days (28 weeks), 210 days (30 weeks) – individual weighing 30 birds per sample
- at the age of 518 days (74 weeks) – individual weighing all birds

6.4 Mortality

- mortality during rearing
- mortality of hens and it's causes

6.5 Egg production

Egg production was recorded daily. Eggs were collected manually at the same time every day. Eggs of different samples were collected separately. Production was evaluated in 14 four week periods, from 127 to 518 days of age.

Results of the egg production:

- per 1 hen housed
- per 1 hen present
- per 1 hen housed for each period

6.6 Sexual maturity

- age of the layers at 10 %. 30 %. 50 % and peak of lay

6.7 Egg weight

- average egg weight for each period
- average egg weight for the whole production
- classification of eggs

6.8 Production of egg mass

- per 1 hen housed
- per 1 hen present

6.9 Second quality eggs

Second quality eggs were sorted out as:

- cracked eggs
- broken eggs
- double-yolk eggs
- shell-less eggs

6.10 Egg quality

- egg weight
- yolk weight
- shell strength
- index of egg shape
- shell thickness
- Haugh's units
- yolk colour
- egg shell colour
- presence of blood spots on the yolk

7 Results

Tab. No. 1	Results of incubation and hatching
Tab. No. 2	Results of rearing
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Tab. No. 5	Feed consumption
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Tab. No. 8	Second quality eggs
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Tab. No. 10a	Egg quality – Period 6
Tab. No. 10b	Egg quality – Period 9
Tab. No. 10c	Egg quality – Period 12
Tab. No. 11	Intensity of lay
Tab. No. 12	Average egg weight

Graph No. 1-4 Intensity of lay

Results of incubation and hatching**Tab. No. 1**

Sample	Cross	Weight of hatching eggs	Fertility	Hatchability	
				Set eggs	Fertile eggs
		g	%	%	%
1	T1	56.29	93.40	87.90	94.10
2	T2	59.06	96.30	91.10	94.60
3	T3	54.96	74.50	69.60	93.40
4	T4	58.04	90.60	82.50	91.00
5	T5	57.78	95.00	91.90	96.80
6	T6	54.13	73.60	60.00	81.50
7	T7	58.53	94.10	87.60	93.10
8	T8	59.72	90.20	75.00	83.20
9	T9	61.49	93.50	86.70	92.70
10	T10	57.42	93.20	89.80	96.30

Sample	Cross	Live weight										Feed consumption per 1 pullet at the age of 126 days kg/bird
		Day 1	Week 2	Week 4	Week 6	Week 8	Week 10	Week 12	Week 14	Week 16	Week 18	
		g	g	g	g	g	g	g	g	g	g	
1	T1	36.0	105.3	230.9	419.5	666.2	894.4	1081.5	1263.0	1426.3	1597.0	7.1
	cage system	35.3	101.5	217.7	375.0	606.3	860.7	1060.0	1187.0	1396.5	1597.0	6.86
	deep litter system	36.6	109.0	244.0	464.0	726.0	928.0	1103.0	1339.0	1456.0	1597.0	7.27
2	T2	37.4	109.4	243.0	426.0	693.0	896.4	1086.2	1236.7	1410.2	1547.3	7.1
	cage system	36.8	107.3	237.0	373.0	648.0	858.7	1047.3	1179.3	1377.3	1571.0	6.88
	deep litter system	38.0	111.5	249.0	479.0	738.0	934.0	1125.0	1294.0	1443.0	1523.5	7.22
3	T3	35.1	100.3	215.0	397.7	648.5	838.5	1052.7	1240.0	1413.9	1536.5	7.2
	cage system	34.7	100.0	223.0	361.3	609.0	824.0	1040.3	1228.0	1415.8	1566.0	7.01
	deep litter system	35.5	100.5	207.0	434.0	688.0	853.0	1065.0	1252.0	1412.0	1507.0	7.38
4	T4	37.3	101.9	221.2	417.5	646.9	875.5	1034.4	1226.4	1401.0	1574.5	7.1
	cage system	37.1	100.8	221.3	388.0	619.7	877.0	1038.7	1198.7	1388.0	1618.0	6.90
	deep litter system	37.5	103.0	221.0	447.0	674.0	874.0	1030.0	1254.0	1414.0	1531.0	7.38
5	T5	37.3	104.7	222.7	414.5	690.0	869.0	1053.9	1240.0	1405.7	1571.8	7.2
	cage system	37.4	104.4	221.3	381.0	693.0	887.0	1078.7	1258.0	1421.3	1541.0	6.88
	deep litter system	37.2	105.0	224.0	448.0	687.0	839.0	1029.0	1222.0	1390.0	1602.5	7.46

Sample	Cross	Live weight										Feed consumption per 1 pullet at the age of 126 days kg/bird
		Day 1	Week 2	Week 4	Week 6	Week 8	Week 10	Week 12	Week 14	Week 16	Week 18	
		g	g	g	g	g	g	g	g	g	g	
6	T6	35.8	97.7	204.9	403.9	663.4	843.5	1043.7	1208.9	1387.2	1548.8	7.4
	cage system	35.1	96.8	211.7	376.7	643.7	849.0	1054.3	1179.7	1373.3	1605.0	7.12
	deep litter system	36.4	98.5	198.0	431.0	683.0	838.0	1033.0	1238.0	1401.0	1492.5	7.63
7	T7	37.1	102.0	220.4	413.0	676.9	874.5	1093.7	1225.5	1389.5	1515.3	7.3
	cage system	36.5	102.4	223.7	386.0	671.7	892.0	1060.3	1219.0	1376.0	1579.0	6.88
	deep litter system	37.7	101.5	217.0	440.0	682.0	857.0	1127.0	1232.0	1403.0	1451.5	7.62
8	T8	38.1	101.5	222.5	408.9	671.0	878.0	1062.7	1227.2	1408.2	1539.3	7.1
	cage system	38.2	102.5	221.0	371.7	642.0	873.0	1055.3	1214.3	1390.3	1512.0	6.98
	deep litter system	37.9	100.5	224.0	446.0	700.0	883.0	1070.0	1240.0	1426.0	1566.5	7.22
9	T9	39.4	105.3	236.9	429.2	713.5	926.4	1133.2	1267.2	1425.2	1503.5	7.2
	cage system	38.7	104.5	226.7	391.3	678.0	930.7	1104.3	1248.3	1429.3	1507.0	6.94
	deep litter system	40.0	106.0	247.0	467.0	749.0	922.0	1162.0	1286.0	1421.0	1500.0	7.46
10	T10	38.6	103.5	236.9	409.0	678.4	880.4	1085.5	1228.2	1419.5	1567.0	7.4
	cage system	38.5	101.5	233.7	376.0	656.7	878.7	1082.0	1216.3	1401.0	1543.0	7.01
	deep litter system	38.7	105.5	240.0	442.0	700.0	882.0	1089.0	1240.0	1438.0	1591.0	7.78

Mortality in rearing

Tab. No. 3

Page 1

Sample	Cross	Number of pullets			
		Initial flock	Final flock	Mortality	
		birds	birds	birds	%
1	T1	270	268	2	0.74
	cage system	180	179	1	0.56
	deep litter system	90	89	1	1.11
2	T2	270	269	1	0.37
	cage system	180	179	1	0.56
	deep litter system	90	90	0	0.00
3	T3	270	263	7	2.59
	cage system	180	175	5	2.78
	deep litter system	90	88	2	2.22
4	T4	270	266	4	1.48
	cage system	180	178	2	1.11
	deep litter system	90	88	2	2.22
5	T5	270	266	4	1.48
	cage system	180	179	1	0.56
	deep litter system	90	87	3	3.33

Mortality in rearing

Tab. No. 3

Page 2

Sample	Cross	Number of pullets			
		Initial flock	Final flock	Mortality	
		birds	birds	birds	%
6	T6	270	253	17	6.30
	cage system	180	172	8	4.44
	deep litter system	90	81	9	10.00
7	T7	270	264	6	2.22
	cage system	180	179	1	0.56
	deep litter system	90	85	5	5.56
8	T8	270	266	4	1.48
	cage system	180	176	4	2.22
	deep litter system	90	90	0	0.00
9	T9	270	263	7	2.59
	cage system	180	176	4	2.22
	deep litter system	90	87	3	3.33
10	T10	270	258	12	4.44
	cage system	180	175	5	2.78
	deep litter system	90	83	7	7.78

Results of the egg yield

Tab. No. 4 (page 1)

Treatment	Cross		Age at the yield					Egg production per				Egg weight	Egg mass per	
			10%	30%	50%	Max.		hen - housed		hen - day			hen - housed	hen - day
	Way of rearing	day				%	number	%	number	%	g	kg	kg	
1	T1	ø	142	146	153	167	100.00	337.56	86.11	339.78	86.68	61.37	20.72	20.85
		a	142	146	150	163	100.00	330.23	84.24	330.23	84.24	61.82	20.41	20.41
		b	143	149	153	167	100.00	341.48	87.11	344.96	88.00	60.93	20.81	21.02
		c	139	145	149	166	100.00	340.95	86.98	344.23	87.81	61.38	20.93	21.13
2	T2	ø	143	149	153	167	100.00	341.93	87.23	343.49	87.62	61.73	21.11	21.20
		a	141	146	150	163	100.00	345.32	88.09	345.32	88.09	61.24	21.15	21.15
		b	144	149	153	167	100.00	350.20	89.34	350.20	89.34	61.75	21.63	21.63
		c	143	149	153	167	100.00	330.28	84.26	334.82	85.41	62.21	20.55	20.83
3	T3	ø	142	149	154	167	100.00	330.84	84.40	332.77	84.89	62.27	20.60	20.72
		a	143	149	153	167	100.00	332.93	84.93	337.35	86.06	62.37	20.76	21.04
		b	142	149	153	167	100.00	337.47	86.09	338.91	86.46	61.45	20.74	20.83
		c	142	149	153	167	100.00	322.13	82.18	322.13	82.18	63.04	20.31	20.31
4	T4	ø	141	146	151	167	100.00	331.77	84.63	336.98	85.96	61.98	20.56	20.89
		a	142	146	149	163	100.00	329.35	84.02	336.18	85.76	62.28	20.51	20.94
		b	140	145	151	166	100.00	347.43	88.63	351.33	89.63	61.71	21.44	21.68
		c	141	146	150	167	100.00	318.52	81.25	323.36	82.49	61.98	19.74	20.04
5	T5	ø	142	146	153	167	100.00	338.32	86.31	342.97	87.49	61.79	20.90	21.19
		a	143	150	153	161	100.00	337.70	86.15	340.83	86.95	61.04	20.61	20.81
		b	141	146	152	167	100.00	348.07	88.79	351.79	89.74	61.71	21.48	21.71
		c	141	146	153	165	100.00	329.18	83.98	336.23	85.77	62.60	20.61	21.05

way of rearing:

a - deep litter + beak trimming

b - cages + beak trimming

c - cages + non beak trimming

Results of the egg yield

Tab. No. 4 (page 2)

Treatment	Cross		Age at the yield					Egg production per				Egg weight	Egg mass per	
			10%	30%	50%	Max.		hen - housed		hen - day			hen - housed	hen - day
	Way of rearing	day				%	number	%	number	%	g	kg	kg	
6	T6	ø	139	144	149	167	100.00	337.71	86.15	341.46	87.11	60.79	20.53	20.76
		a	139	143	149	156	100.00	337.92	86.20	341.14	87.02	60.85	20.56	20.76
		b	137	145	149	167	100.00	352.83	90.01	352.83	90.01	60.71	21.42	21.42
		c	139	144	146	161	100.00	322.38	82.24	330.13	84.22	60.80	19.60	20.07
7	T7	ø	140	147	151	167	100.00	340.89	86.96	345.56	88.15	61.60	21.00	21.29
		a	139	143	146	163	100.00	339.27	86.55	347.39	88.62	60.79	20.62	21.12
		b	140	145	149	166	100.00	347.33	88.61	350.61	89.44	61.29	21.29	21.49
		c	143	153	165	165	100.00	331.23	84.50	331.97	84.69	63.96	21.19	21.23
8	T8	ø	141	148	151	167	100.00	332.86	84.91	335.21	85.51	62.21	20.71	20.85
		a	142	146	149	166	100.00	327.27	83.49	331.62	84.60	62.16	20.34	20.61
		b	141	149	153	167	100.00	351.17	89.58	351.17	89.58	61.86	21.72	21.72
		c	141	148	151	167	100.00	320.13	81.67	322.69	82.32	62.64	20.05	20.21
9	T9	ø	143	149	154	167	100.00	342.40	87.35	343.31	87.58	61.91	21.20	21.25
		a	143	148	153	167	100.00	339.50	86.61	340.88	86.96	61.38	20.84	20.92
		b	143	152	153	167	100.00	346.47	88.38	347.09	88.54	62.08	21.51	21.55
		c	145	150	152	167	100.00	341.23	87.05	341.96	87.23	62.25	21.24	21.29
10	T10	ø	142	150	153	167	100.00	333.17	84.99	336.23	85.77	64.11	21.36	21.55
		a	142	149	153	167	100.00	329.82	84.14	330.24	84.24	64.89	21.40	21.43
		b	142	149	153	165	100.00	334.62	85.36	343.00	87.50	63.22	21.15	21.68
		c	142	146	150	167	100.00	335.07	85.48	335.59	85.61	64.26	21.53	21.56

way of rearing:

a - deep litter + beak trimming

b - cages + beak trimming

c - cages + non beak trimming

Feed consumption

Tab. No. 5 (page 1)

Treatment	Cross		Feed consumption			
			per 1 hen	per 1 egg	per 1 kg of egg mass	per 1 feeding day
	Way of rearing		kg	g	kg	g
1	T1	ø	50.79	149.48	2.44	129.57
		a	50.32	152.38	2.47	128.37
		b	52.05	150.88	2.48	132.77
		c	50.01	145.28	2.37	127.58
2	T2	ø	50.68	147.54	2.39	129.28
		a	50.43	146.05	2.38	128.66
		b	50.92	145.40	2.35	129.90
		c	50.68	151.35	2.43	129.27
3	T3	ø	50.35	151.32	2.43	128.46
		a	51.02	151.24	2.43	130.16
		b	50.53	149.10	2.43	128.91
		c	49.52	153.73	2.44	126.33
4	T4	ø	51.03	151.44	2.44	130.18
		a	51.80	154.08	2.47	132.14
		b	51.73	147.24	2.39	131.96
		c	49.57	153.29	2.47	126.45
5	T5	ø	50.75	147.98	2.39	129.47
		a	50.73	148.84	2.44	129.41
		b	51.34	145.93	2.36	130.96
		c	50.19	149.28	2.38	128.04

way of rearing: a - deep litter + beak trimming b - cages + beak trimming c - cages + non beak trimming

Feed consumption

Tab. No. 5 (page 2)

Treatment	Cross		Feed consumption			
			per 1 hen	per 1 egg	per 1 kg of egg mass	per 1 feeding day
	Way of rearing		kg	g	kg	g
6	T6	ø	50.63	148.28	2.44	129.16
		a	50.31	147.49	2.42	128.35
		b	51.33	145.48	2.40	130.94
		c	50.24	152.17	2.50	128.15
7	T7	ø	50.91	147.33	2.39	129.87
		a	51.22	147.43	2.43	130.65
		b	50.77	144.81	2.36	129.52
		c	50.59	152.39	2.38	129.06
8	T8	ø	51.02	152.21	2.45	130.16
		a	50.96	153.66	2.47	129.99
		b	51.18	145.74	2.36	130.56
		c	50.93	157.83	2.52	129.92
9	T9	ø	50.79	147.93	2.39	129.56
		a	50.53	148.24	2.41	128.91
		b	51.67	148.86	2.40	131.81
		c	50.16	146.68	2.36	127.96
10	T10	ø	50.79	151.06	2.36	129.56
		a	50.49	152.88	2.36	128.79
		b	51.76	150.89	2.39	132.03
		c	50.15	149.43	2.33	127.93

way of rearing: a - deep litter + beak trimming b - cages + beak trimming c - cages + non beak trimming

Live weight of laying hens

Tab. No. 6 (page 1)

Treatment	Cross		Live weight (g)						
	Way of rearing		week 20	week 22	week 24	week 26	week 28	week 30	final live weight
1	T1	ø	1797.0	1846.7	1893.3	1962.0	2014.3	2044.3	2392.8
		a	1840	1881	1950	1987	2083	2115	2312.0
		b	1725	1860	1861	1943	1998	2052	2394.6
		c	1826	1799	1869	1956	1962	1966	2549.1
2	T2	ø	1752.3	1748.0	1885.7	1951.3	1940.0	1984.7	2300.6
		a	1770	1750	1973	1942	1940	1972	2292.0
		b	1761	1724	1855	1939	1902	1944	2323.2
		c	1726	1770	1829	1973	1978	2038	2251.9
3	T3	ø	1803.7	1818.3	1874.0	1966.3	2016.3	2042.7	2262.0
		a	1814	1851	1873	1975	2026	2062	2308.6
		b	1831	1828	2013	1955	2039	2011	2201.2
		c	1766	1776	1736	1969	1984	2055	2350.6
4	T4	ø	1847.3	1795.3	1841.0	1969.3	2028.3	2017.0	2251.1
		a	1876	1838	1798	2004	2096	2021	2275.6
		b	1830	1754	1785	1966	1995	2063	2277.6
		c	1836	1794	1940	1938	1994	1967	2129.3
5	T5	ø	1791.0	1807.7	1920.7	1994.0	2105.0	2073.7	2328.4
		a	1770	1815	1982	2010	2206	2055	2297.3
		b	1812	1810	1853	1989	2115	2139	2341.8
		c	1791	1798	1927	1983	1994	2027	2346.4

way of rearing:

a - deep litter + beak trimming

b - cages + beak trimming

c - cages + non beak trimming

Live weight of laying hens

Tab. No. 6 (page 2)

Treatment	Cross		Live weight (g)						
	Way of rearing		week 20	week 22	week 24	week 26	week 28	week 30	final live weight
6	T6	ø	1764.0	1757.0	1778.0	1960.7	1969.7	1966.0	2175.4
		a	1795	1766	1824	1967	2036	1981	2158.2
		b	1731	1763	1745	1957	1874	1917	2191.0
		c	1766	1742	1765	1958	1999	2000	2176.4
7	T7	ø	1745.3	1752.7	1807.3	1969.0	1974.0	1970.3	2259.3
		a	1771	1729	1789	1968	1990	1941	2203.2
		b	1763	1747	1801	1979	1957	1959	2389.8
		c	1702	1782	1832	1960	1975	2011	2098.5
8	T8	ø	1827.3	1829.3	1912.3	1976.0	2067.0	2063.7	2375.8
		a	1830	1770	1906	2010	2094	2068	2386.6
		b	1807	1902	1937	1960	2089	2059	2386.6
		c	1845	1816	1894	1958	2018	2064	2353.8
9	T9	ø	1756.3	1784.0	1847.0	1930.3	2032.7	2033.0	2333.2
		a	1753	1760	1820	1950	1995	2011	2357.4
		b	1762	1794	1909	1950	2049	2068	2295.0
		c	1754	1798	1812	1891	2054	2020	2315.4
10	T10	ø	1848.0	1841.7	1895.0	1960.3	2078.3	2079.3	2287.1
		a	1740	1809	1904	1980	2043	1997	2280.9
		b	1909	1879	1909	1944	2096	2093	2259.3
		c	1895	1837	1872	1957	2096	2148	2309.5

way of rearing:

a - deep litter + beak trimming

b - cages + beak trimming

c - cages + non beak trimming

Mortality and it's causes

Tab. No. 7 (page 1)

Treatment	Cross		Number of hens				Causes																
			Initial flock	Final flock	Mortality		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
	Way of rearing		Birds	Birds	Birds	%																	
1	T1	ø	180	175	5	2.78										1	1	3					
		a	60	60	0	0.00																	
		b	60	56	4	6.67											1	3					
		c	60	59	1	1.67											1						
2	T2	ø	180	178	2	1.11										1		1					
		a	60	60	0	0.00																	
		b	60	60	0	0.00																	
		c	60	58	2	3.33										1		1					
3	T3	ø	180	178	2	1.11						1							1				
		a	60	59	1	1.67						1								1			
		b	60	59	1	1.67															1		
		c	60	60	0	0.00																	
4	T4	ø	180	172	8	4.44		1				1					1		5				
		a	60	56	4	6.67											1		3				
		b	60	58	2	3.33						1							1				
		c	60	58	2	3.33		1												1			

way of rearing: a - deep litter + beak trimming b - cages + beak trimming c - cages + non beak trimming

Diagnostic: 1 - Viral diseases 6 - Injuries 11 - Metabolic derangement
 2 - Bacterial diseases 7 - Digestive tract diseases 12 - Cannibalism
 3 - Fungal diseases 8 - Respiratory tract diseases 13 - Diverticulus inflammation
 4 - Parasitary diseases 9 - Reproduction tract diseases 14 - Culling and other causes
 5 - Tumors 10 - Locomotion apparatus diseases 15 - Sampling (excluded of calculation)

Mortality and it's causes

Tab. No. 7 (page 2)

Treatment	Cross		Number of hens				Causes														
			Initial flock	Final flock	Mortality		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Birds	Birds	Birds	%																	
5	T5	ø	180	173	7	3.89									2		5				
		a	60	58	2	3.33											2				
		b	60	59	1	1.67											1				
		c	60	56	4	6.67									2		2				
6	T6	ø	180	173	7	3.89									4		3				
		a	60	58	2	3.33									1		1				
		b	60	60	0	0.00															
		c	60	55	5	8.33									3		2				
7	T7	ø	150	144	6	4.00									3	1	2				
		a	60	57	3	5.00									2	1					
		b	60	59	1	1.67									1						
		c	30	28	2	6.67											2				
8	T8	ø	180	176	4	2.22		1							1		2				
		a	60	58	2	3.33		1							1						
		b	60	60	0	0.00															
		c	60	58	2	3.33											2				

way of rearing: a - deep litter + beak trimming b - cages + beak trimming c - cages + non beak trimming

Diagnostic: 1 - Viral diseases 6 - Injuries 11 - Metabolic derangement
 2 - Bacterial diseases 7 - Digestive tract diseases 12 - Cannibalism
 3 - Fungal diseases 8 - Respiratory tract diseases 13 - Diverticulus inflammation
 4 - Parasitary diseases 9 - Reproduction tract diseases 14 - Culling and other causes
 5 - Tumors 10 - Locomotion apparatus diseases 15 - Sampling (excluded of calculation)

Mortality and it's causes

Tab. No. 7 (page 3)

Treatment	Cross		Number of hens				Causes																		
			Initial flock	Final flock	Mortality		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15				
	Birds	Birds	Birds	%																					
9	T9	ø	180	177	3	1.67											2		1						
		a	60	59	1	1.67												1							
		b	60	59	1	1.67													1						
		c	60	59	1	1.67														1					
10	T10	ø	180	173	7	3.89											5		2						
		a	60	58	2	3.33													2						
		b	60	57	3	5.00													3						
		c	60	58	2	3.33													2						

way of rearing:

a - deep litter + beak trimming

b - cages + beak trimming

c - cages + non beak trimming

Diagnostic:

1 - Viral diseases

2 - Bacterial diseases

3 - Fungal diseases

4 - Parasitary diseases

5 - Tumors

6 - Injuries

7 - Digestive tract diseases

8 - Respiratory tract diseases

9 - Reproduction tract diseases

10 - Locomotion apparatus diseases

11 - Metabolic derangement

12 - Cannibalism

13 - Diverticulus inflammation

14 - Culling and other causes

15 - Sampling (excluded of calculation)

Second quality eggs

Tab. No. 8 (page 1)

Treatment	Cross		Eggs laid	Cracked		Broken eggs		Double-yolked		Membranes		Nonstandard together	
	Way of rearing		number	number	%	number	%	number	%	number	%	number	%
1	T1	ø	60760	2879	4.74	1621	2.67	0	0.00	320	0.53	4820	7.93
		a	19814	957	4.83	620	3.13	0	0.00	76	0.38	1653	8.34
		b	20489	932	4.55	476	2.32	0	0.00	98	0.48	1506	7.35
		c	20457	990	4.84	525	2.57	0	0.00	146	0.71	1661	8.12
2	T2	ø	61548	3021	4.91	1821	2.96	0	0.00	364	0.59	5206	8.46
		a	20719	1056	5.10	686	3.31	0	0.00	109	0.53	1851	8.93
		b	21012	1017	4.84	506	2.41	0	0.00	115	0.55	1638	7.80
		c	19817	948	4.78	629	3.17	0	0.00	140	0.71	1717	8.66
3	T3	ø	59552	2936	4.93	1768	2.97	1	0.00	419	0.70	5124	8.60
		a	19976	1009	5.05	647	3.24	1	0.01	129	0.65	1786	8.94
		b	20248	973	4.81	563	2.78	0	0.00	150	0.74	1686	8.33
		c	19328	954	4.94	558	2.89	0	0.00	140	0.72	1652	8.55
4	T4	ø	59718	2800	4.69	1653	2.77	3	0.01	459	0.77	4915	8.23
		a	19761	1014	5.13	620	3.14	1	0.01	134	0.68	1769	8.95
		b	20846	877	4.21	459	2.20	1	0.00	170	0.82	1507	7.23
		c	19111	909	4.76	574	3.00	1	0.01	155	0.81	1639	8.58
5	T5	ø	60897	2990	4.91	1760	2.89	7	0.01	410	0.67	5167	8.48
		a	20262	1070	5.28	648	3.20	5	0.02	152	0.75	1875	9.25
		b	20884	962	4.61	559	2.68	2	0.01	129	0.62	1652	7.91
		c	19751	958	4.85	553	2.80	0	0.00	129	0.65	1640	8.30

way of rearing: a - deep litter + beak trimming b - cages + beak trimming c - cages + non beak trimming

Second quality eggs

Tab. No. 8 (page 2)

Treatment	Cross		Eggs laid	Cracked		Broken eggs		Double-yolked		Membranes		Nonstandard together	
	Way of rearing		number	number	%	number	%	number	%	number	%	number	%
6	T6	ø	60788	2891	4.76	1554	2.56	4	0.01	368	0.61	4817	7.92
		a	20275	1029	5.08	566	2.79	3	0.01	109	0.54	1707	8.42
		b	21170	1000	4.72	529	2.50	0	0.00	155	0.73	1684	7.95
		c	19343	862	4.46	459	2.37	1	0.01	104	0.54	1426	7.37
7	T7	ø	51133	2421	4.73	1231	2.41	1	0.00	303	0.59	3956	7.74
		a	20356	1009	4.96	466	2.29	0	0.00	116	0.57	1591	7.82
		b	20840	942	4.52	447	2.14	1	0.00	112	0.54	1502	7.21
		c	9937	470	4.73	318	3.20	0	0.00	75	0.75	863	8.68
8	T8	ø	59914	3013	5.03	1547	2.58	1	0.00	382	0.64	4943	8.25
		a	19636	1126	5.73	592	3.01	0	0.00	141	0.72	1859	9.47
		b	21070	946	4.49	489	2.32	0	0.00	110	0.52	1545	7.33
		c	19208	941	4.90	466	2.43	1	0.01	131	0.68	1539	8.01
9	T9	ø	61632	3112	5.05	1761	2.86	1	0.00	407	0.66	5281	8.57
		a	20370	1067	5.24	598	2.94	0	0.00	140	0.69	1805	8.86
		b	20788	1047	5.04	597	2.87	0	0.00	121	0.58	1765	8.49
		c	20474	998	4.87	566	2.76	1	0.00	146	0.71	1711	8.36
10	T10	ø	59970	2987	4.98	1561	2.60	4	0.01	339	0.57	4891	8.16
		a	19789	1110	5.61	567	2.87	0	0.00	138	0.70	1815	9.17
		b	20077	890	4.43	492	2.45	0	0.00	84	0.42	1466	7.30
		c	20104	987	4.91	502	2.50	4	0.02	117	0.58	1610	8.01

way of rearing: a - deep litter + beak trimming b - cages + beak trimming c - cages + non beak trimming

Weight classes of eggs

Tab. No. 9 (page 1)

Treatment	Cross		Egg weight	XL	L	M	S
				(= > 73 g)	(63 - 73 g)	(53 - 63 g)	(= < 53 g)
	Way of rearing		g	%	%	%	%
1	T1	ø	61.37	1.81	30.88	65.01	2.31
		a	61.82	2.67	35.61	59.90	1.82
		b	60.93	0.85	27.04	69.50	2.61
		c	61.38	1.95	30.24	65.33	2.48
2	T2	ø	61.73	2.34	33.89	61.11	2.65
		a	61.24	0.98	31.91	64.54	2.57
		b	61.75	1.57	36.32	60.29	1.81
		c	62.21	4.62	33.30	58.43	3.65
3	T3	ø	62.27	3.33	37.34	57.28	2.05
		a	62.37	3.32	36.11	58.71	1.85
		b	61.45	1.58	34.63	61.70	2.09
		c	63.04	5.17	41.41	51.21	2.21
4	T4	ø	61.98	3.25	36.75	57.09	2.92
		a	62.28	2.99	38.87	55.75	2.39
		b	61.71	2.05	36.60	58.32	3.03
		c	61.98	4.88	34.74	57.05	3.33
5	T5	ø	61.79	2.95	33.06	61.16	2.83
		a	61.04	1.90	27.95	67.35	2.80
		b	61.71	3.49	32.45	60.53	3.53
		c	62.60	3.41	38.81	55.67	2.10

way of rearing: a - deep litter + beak trimming

b - cages + beak trimming

c - cages + non beak trimming

Weight classes of eggs

Tab. No. 9 (page 2)

Treatment	Cross		Egg weight	XL	L	M	S
				(= > 73 g)	(63 - 73 g)	(53 - 63 g)	(= < 53 g)
	Way of rearing		g	%	%	%	%
6	T6	ø	60.79	1.39	27.77	66.97	3.87
		a	60.85	1.34	30.96	64.44	3.26
		b	60.71	1.50	26.18	68.07	4.25
		c	60.80	1.32	26.25	68.35	4.07
7	T7	ø	61.60	2.54	33.24	61.28	2.94
		a	60.79	0.78	29.38	67.07	2.77
		b	61.29	1.86	31.06	63.27	3.82
		c	63.96	7.60	45.82	45.18	1.39
8	T8	ø	62.21	2.63	37.17	58.50	1.70
		a	62.16	2.38	38.57	57.64	1.41
		b	61.86	2.13	35.25	60.94	1.68
		c	62.64	3.44	37.94	56.61	2.00
9	T9	ø	61.91	3.66	33.50	60.27	2.56
		a	61.38	3.40	29.92	63.76	2.93
		b	62.08	4.68	32.01	61.10	2.21
		c	62.25	2.87	38.54	56.02	2.56
10	T10	ø	64.11	9.45	43.42	45.09	2.04
		a	64.89	10.75	47.45	39.82	1.97
		b	63.22	7.96	40.01	49.17	2.86
		c	64.26	9.73	42.99	46.03	1.25

way of rearing: a - deep litter + beak trimming

b - cages + beak trimming

c - cages + non beak trimming

Egg quality - Period 6

Tab. No. 10a

Sample	Cross	Egg weight	Yolk weight	Shell strength	Index of egg shape	Shell thickness	Haugh's units	Yolk colour				Egg shell colour			Blood spot
		g	g	N		mm		L	a	b	Roche	L	a	b	
1	T1	60.62	18.41	46.36	1.28	0.38	83.82	-0.95	2.0	12.9	9.12	62.30	20.4	31.0	4
2	T2	60.72	18.96	44.38	1.26	0.37	77.35	-1.27	2.3	12.6	9.50	59.07	22.3	31.0	3
3	T3	62.03	19.34	46.47	1.27	0.38	76.90	-0.70	2.1	13.1	9.23	62.52	20.8	31.1	1
4	T4	60.70	19.55	51.86	1.29	0.37	76.92	0.63	1.8	14.1	8.60	59.18	21.5	31.4	2
5	T5	60.99	19.70	51.01	1.28	0.37	76.50	-1.02	2.3	12.7	9.43	57.47	22.8	31.0	2
6	T6	61.14	18.78	49.63	1.28	0.37	76.53	-0.48	2.2	13.3	9.15	62.47	19.3	30.8	6
7	T7	60.97	18.63	52.61	1.29	0.38	76.53	0.00	2.0	13.6	9.03	58.68	20.5	31.6	8
8	T8	61.72	18.37	45.76	1.27	0.38	86.60	-0.38	2.2	13.4	9.18	63.03	19.2	30.5	1
9	T9	61.56	18.07	42.47	1.25	0.38	80.77	-0.95	2.0	12.9	9.30	59.08	21.1	31.3	7
10	T10	64.84	18.93	48.74	1.28	0.37	75.35	0.40	1.9	13.9	8.75	59.83	19.7	30.3	10

Interpretative notes:

L - colour of egg (0=black. 100=white)

a - red colouring and it's fullness

b - yellow colouring and it's fullness

Egg quality - Period 9

Tab. No. 10b

Sample	Cross	Egg weight	Yolk weight	Shell strength	Index of egg shape	Shell thickness	Haugh's units	Yolk colour				Egg shell colour			Blood spot
		g	g	N		mm		L	a	b	Roche	L	a	b	
1	T1	61.58	17.31	41.35	1.29	0.36	90.05	-3.63	2.9	10.6	10.75	63.05	17.9	30.3	2
2	T2	62.63	17.50	41.15	1.28	0.35	87.33	-6.32	3.7	8.4	12.27	59.55	20.7	30.0	4
3	T3	62.60	17.45	41.50	1.28	0.36	88.03	-4.82	3.2	9.7	11.37	61.45	18.9	29.5	4
4	T4	63.24	17.82	47.44	1.30	0.35	83.08	-3.68	2.9	10.6	10.83	60.83	19.0	30.6	3
5	T5	61.85	17.49	45.18	1.29	0.36	83.53	-2.80	2.6	11.2	10.22	59.30	19.9	30.2	3
6	T6	61.70	17.42	41.59	1.29	0.36	82.90	-1.83	2.4	12.2	9.78	62.67	17.8	29.2	4
7	T7	62.64	17.71	44.47	1.31	0.36	82.45	-3.07	2.5	11.1	10.15	60.72	19.1	30.8	4
8	T8	61.68	17.99	39.32	1.29	0.36	84.72	-2.97	2.8	11.2	10.40	63.70	18.4	30.7	1
9	T9	63.03	18.47	38.28	1.27	0.36	82.08	-4.08	2.8	10.2	10.93	60.05	20.6	30.7	4
10	T10	64.51	18.41	43.36	1.30	0.36	78.98	-2.67	2.7	11.4	10.37	62.23	19.7	30.6	4

Interpretative notes:

L - colour of egg (0=black. 100=white)

a - red colouring and it's fullness

b - yellow colouring and it's fullness

Egg quality - Period 12

Tab. No. 10c

Sample	Cross	Egg weight	Yolk weight	Shell strength	Index of egg shape	Shell thickness	Haugh's units	Yolk colour				Egg shell colour			Blood spot
		g	g	N		mm		L	a	b	Roche	L	a	b	
1	T1	62.27	17.56	37.13	1.31	0.35	86.18	-3.78	2.6	10.5	10.43	62.65	17.7	29.6	6
2	T2	62.74	17.48	34.36	1.29	0.35	78.53	-4.12	2.7	10.3	10.57	61.77	18.7	29.9	5
3	T3	62.76	17.97	38.82	1.30	0.36	77.52	-2.72	2.5	11.4	10.08	63.70	18.2	29.4	6
4	T4	63.73	18.82	40.56	1.32	0.35	73.05	-1.13	1.8	12.7	8.97	62.22	17.3	30.4	7
5	T5	63.33	18.68	42.89	1.31	0.35	74.62	-1.63	1.9	12.3	9.00	59.95	19.7	30.8	5
6	T6	62.67	18.54	38.54	1.30	0.35	64.73	0.15	1.8	13.7	8.42	63.43	17.3	28.9	4
7	T7	61.96	18.20	42.74	1.32	0.36	66.72	-0.77	1.8	13.0	8.67	60.45	18.9	30.2	2
8	T8	62.79	17.98	35.32	1.31	0.35	74.93	-0.33	1.6	13.3	8.55	63.23	17.7	29.7	1
9	T9	61.98	18.20	36.09	1.29	0.35	71.72	-0.80	1.7	12.9	8.67	60.23	19.1	30.0	1
10	T10	66.35	18.60	39.31	1.32	0.35	66.27	-1.08	1.9	12.7	9.08	62.13	17.9	30.0	3

Interpretative notes:

L - colour of egg (0=black. 100=white)

a - red colouring and it's fullness

b - yellow colouring and it's fullness

Laying intensity

Tab. No. 11 (page 1)

in four weeks long periods (%)

Sample	Cross		Period													
	Way of rearing		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	T1	ø	35.60	92.62	94.25	94.44	93.13	92.36	90.20	88.87	88.23	88.00	87.80	87.40	87.46	85.20
		a	36.85	90.30	91.19	91.96	90.60	89.23	88.21	86.07	86.25	86.67	85.65	84.94	85.65	85.83
		b	28.81	94.88	97.32	97.50	96.31	94.23	91.55	90.71	89.52	89.11	89.23	88.63	87.26	84.52
		c	41.13	92.68	94.23	93.87	92.50	93.63	90.83	89.82	88.93	88.21	88.51	88.63	89.46	85.24
2	T2	ø	33.17	90.95	94.96	94.44	94.46	92.88	92.70	91.11	90.20	90.93	90.93	88.37	89.19	86.88
		a	39.05	90.95	93.93	94.35	94.46	93.93	92.98	90.83	90.77	92.14	91.90	89.05	89.88	89.05
		b	29.58	92.50	96.55	95.42	95.12	95.06	95.89	95.30	93.51	93.57	92.92	91.43	92.38	91.49
		c	30.89	89.40	94.40	93.57	93.81	89.64	89.23	87.20	86.31	87.08	87.98	84.64	85.30	80.12
3	T3	ø	31.96	90.85	93.65	92.28	90.81	91.01	89.60	88.33	86.83	86.49	87.28	84.21	85.26	83.02
		a	30.77	93.87	95.12	94.46	91.73	91.13	89.70	87.20	87.14	87.56	87.92	84.46	84.94	83.04
		b	32.26	91.01	94.52	94.46	93.10	93.33	92.02	89.94	89.40	88.04	89.05	85.77	86.85	85.48
		c	32.86	87.68	91.31	87.92	87.62	88.57	87.08	87.86	83.93	83.87	84.88	82.38	83.99	80.54
4	T4	ø	36.92	92.76	93.67	93.25	92.14	91.19	87.40	86.55	86.88	86.90	87.08	85.52	84.76	79.84
		a	38.10	92.62	93.75	93.57	91.25	90.36	85.65	83.81	85.00	86.85	85.71	85.48	84.64	79.46
		b	35.71	95.54	97.32	95.42	95.42	94.35	92.38	90.95	89.82	90.83	93.39	92.44	89.64	87.62
		c	36.96	90.12	89.94	90.77	89.76	88.87	84.17	84.88	85.83	83.04	82.14	78.63	80.00	72.44
5	T5	ø	33.29	93.83	94.05	94.07	93.47	93.21	91.90	88.33	88.95	89.13	89.17	87.64	87.52	83.71
		a	29.40	95.30	94.46	94.52	94.46	94.94	93.10	89.40	90.12	89.11	86.90	86.07	86.25	82.02
		b	34.88	94.23	96.01	95.77	95.12	95.18	93.27	91.07	91.79	92.20	92.80	90.60	91.79	88.39
		c	35.60	91.96	91.67	91.90	90.83	89.52	89.35	84.52	84.94	86.07	87.80	86.25	84.52	80.71

way of rearing: a - deep litter + beak trimming b - cages + beak trimming c - cages + non beak trimming

Laying intensity

Tab. No. 11 (page 2)

in four weeks long periods (%)

Sample	Cross		Period													
	Way of rearing		1	2	3	4	5	6	7	8	9	10	11	12	13	14
6	T6	ø	43.23	94.62	94.54	94.15	93.73	92.12	90.48	88.65	87.74	88.47	86.53	84.64	85.52	81.69
		a	44.58	95.77	95.36	95.18	95.42	93.45	88.63	85.65	85.71	86.90	86.25	83.99	86.85	83.10
		b	41.31	95.06	96.07	95.83	95.89	94.05	94.94	95.42	94.05	95.12	92.02	90.42	91.67	88.27
		c	43.81	93.04	92.20	91.43	89.88	88.87	87.86	84.88	83.45	83.39	81.31	79.52	78.04	73.69
7	T7	ø	42.19	94.76	95.95	94.50	94.52	93.43	92.31	90.98	87.55	88.79	88.14	85.38	85.55	83.40
		a	47.56	95.42	95.48	93.51	93.75	93.51	91.96	89.11	84.29	87.02	87.32	83.93	85.00	83.81
		b	40.77	96.55	98.04	96.13	96.43	95.60	94.17	93.33	90.71	90.24	89.40	87.38	87.08	84.64
		c	34.29	89.88	92.74	93.21	92.26	88.93	89.29	90.00	87.74	89.40	87.26	84.29	83.57	80.12
8	T8	ø	35.99	92.58	92.98	93.49	92.20	90.44	89.92	89.07	87.12	86.65	87.40	85.08	85.24	80.62
		a	37.74	92.20	92.14	92.50	92.02	90.65	88.99	86.25	83.69	82.38	84.52	82.98	82.98	79.76
		b	34.88	94.11	95.06	96.67	95.00	94.70	94.58	95.06	93.04	93.39	93.57	91.31	92.80	90.00
		c	35.36	91.43	91.73	91.31	89.58	85.95	86.19	85.89	84.64	84.17	84.11	80.95	79.94	72.08
9	T9	ø	29.23	90.20	95.56	95.38	93.27	93.21	93.10	92.52	91.09	91.45	92.14	89.52	89.35	86.85
		a	33.39	91.43	94.70	93.87	91.79	91.31	91.19	91.55	90.71	90.89	90.18	87.92	87.86	85.71
		b	25.71	91.07	96.61	97.92	94.70	94.52	93.99	95.06	92.98	92.44	93.75	90.24	90.83	87.56
		c	28.57	88.10	95.36	94.35	93.33	93.81	94.11	90.95	89.58	91.01	92.50	90.42	89.35	87.26
10	T10	ø	32.14	91.39	94.58	94.88	93.61	92.56	89.90	88.73	87.96	88.41	88.83	84.23	83.99	78.67
		a	27.98	89.82	94.11	93.93	92.62	92.14	89.58	87.80	87.50	87.68	88.33	83.75	83.04	79.64
		b	32.02	93.51	95.54	97.08	94.52	92.38	88.87	87.98	87.50	88.99	87.14	83.10	84.23	82.20
		c	36.43	90.83	94.11	93.63	93.69	93.15	91.25	90.42	88.87	88.57	91.01	85.83	84.70	74.17

way of rearing: a - deep litter + beak trimming b - cages + beak trimming c - cages + non beak trimming

Average weight of eggs

Tab. No. 12 (page 1)

in four weeks long periods (g)

Treatment	Cross		Period													
	Way of rearing		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	T1	ø	52.33	57.42	59.91	61.46	61.36	61.93	62.82	62.60	62.47	61.91	62.57	62.23	62.52	62.51
		a	53.26	58.87	60.00	62.00	62.15	62.31	63.44	63.07	62.55	61.99	62.43	62.46	63.40	62.79
		b	49.91	56.91	59.64	61.27	60.59	61.74	62.10	62.04	62.46	61.67	62.31	61.55	61.67	62.13
		c	53.36	56.54	60.13	61.17	61.39	61.79	62.95	62.72	62.38	62.10	62.98	62.71	62.52	62.63
2	T2	ø	50.50	57.38	59.74	61.57	61.48	62.24	63.43	63.03	62.36	62.80	63.23	62.98	63.40	63.12
		a	51.41	57.69	59.69	61.56	61.19	61.40	62.60	62.30	61.58	61.86	62.65	62.50	62.68	62.78
		b	49.25	57.21	59.56	61.18	61.24	62.55	63.62	63.04	62.39	62.82	63.21	63.06	63.78	63.13
		c	50.53	57.26	60.00	61.99	62.01	62.79	64.08	63.78	63.18	63.71	63.89	63.36	63.77	63.49
3	T3	ø	51.08	57.45	60.44	62.12	62.24	62.90	64.04	63.83	63.33	63.13	63.71	63.64	63.22	64.00
		a	52.00	58.09	60.07	62.52	62.06	62.95	64.30	63.94	63.40	63.16	63.50	63.48	63.11	64.47
		b	50.28	56.56	59.81	61.36	61.48	61.97	63.18	63.48	62.40	62.27	62.74	63.04	61.96	62.88
		c	51.02	57.74	61.46	62.50	63.20	63.83	64.69	64.09	64.25	64.04	64.89	64.50	64.63	64.68
4	T4	ø	49.53	57.29	60.22	61.49	61.74	62.52	63.95	63.38	63.33	63.32	63.36	63.51	63.79	63.82
		a	49.91	57.92	60.13	62.45	61.79	62.91	64.72	63.43	63.14	63.66	63.56	63.56	63.96	64.70
		b	49.58	57.23	60.18	60.71	61.81	61.90	63.56	62.98	62.97	62.45	62.86	63.40	63.62	63.78
		c	49.10	56.71	60.35	61.27	61.60	62.84	63.62	63.76	63.87	63.96	63.76	63.61	63.82	63.08
5	T5	ø	49.31	57.17	60.42	61.89	61.88	62.29	62.74	63.40	63.06	62.84	62.78	62.82	63.20	63.87
		a	48.35	57.45	59.88	61.25	61.91	61.57	61.97	61.86	61.74	61.74	61.80	61.90	61.93	63.14
		b	49.59	57.11	60.00	61.46	61.60	62.20	62.25	64.18	63.10	62.45	62.87	62.58	63.68	63.59
		c	49.84	56.95	61.39	62.98	62.14	63.13	64.01	64.05	64.38	64.32	63.60	63.90	63.94	64.93

way of rearing: a - deep litter + beak trimming b - cages + beak trimming c - cages + non beak trimming

Average weight of eggs

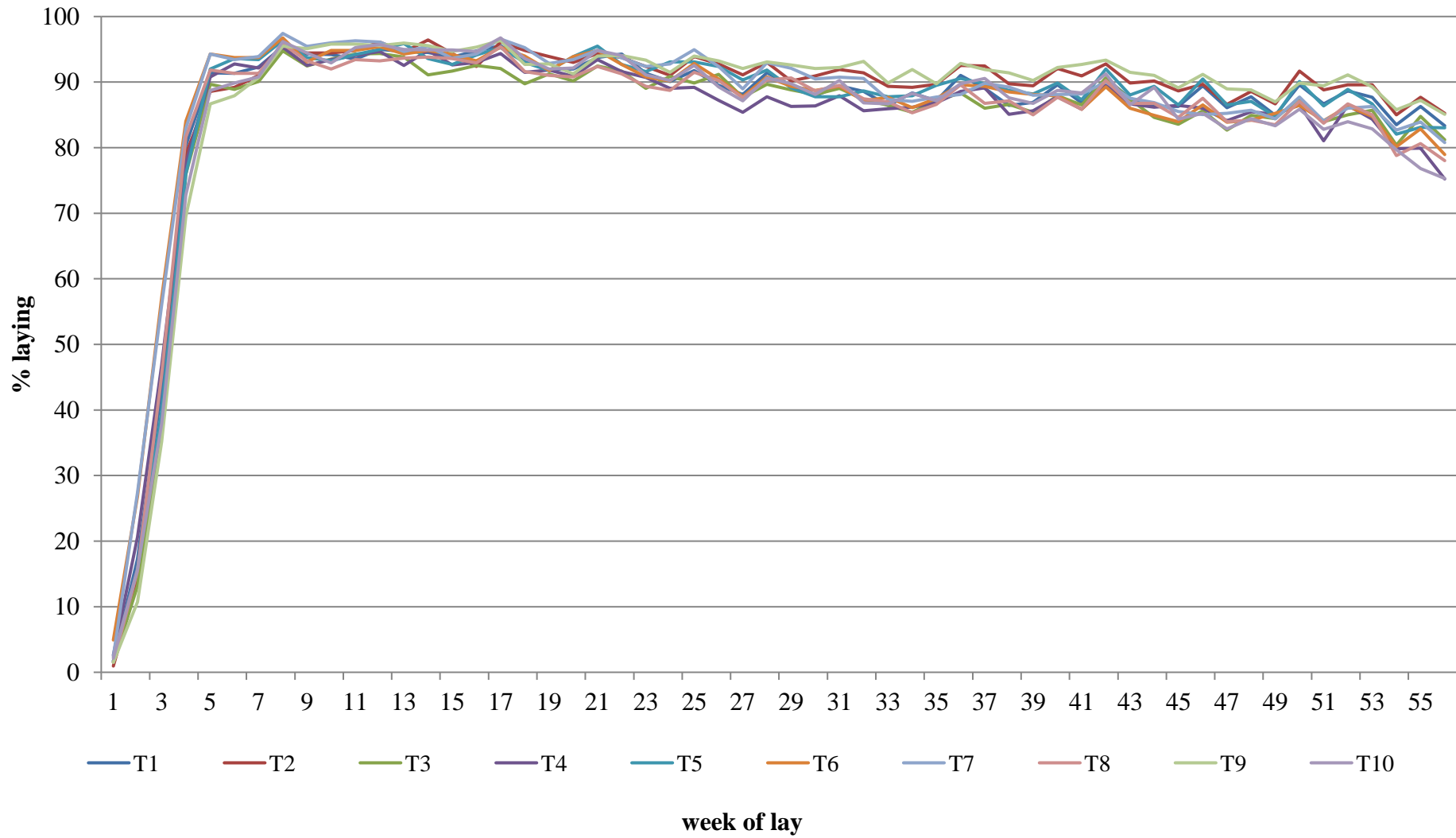
Tab. No. 12 (page 2)

in four weeks long periods (g)

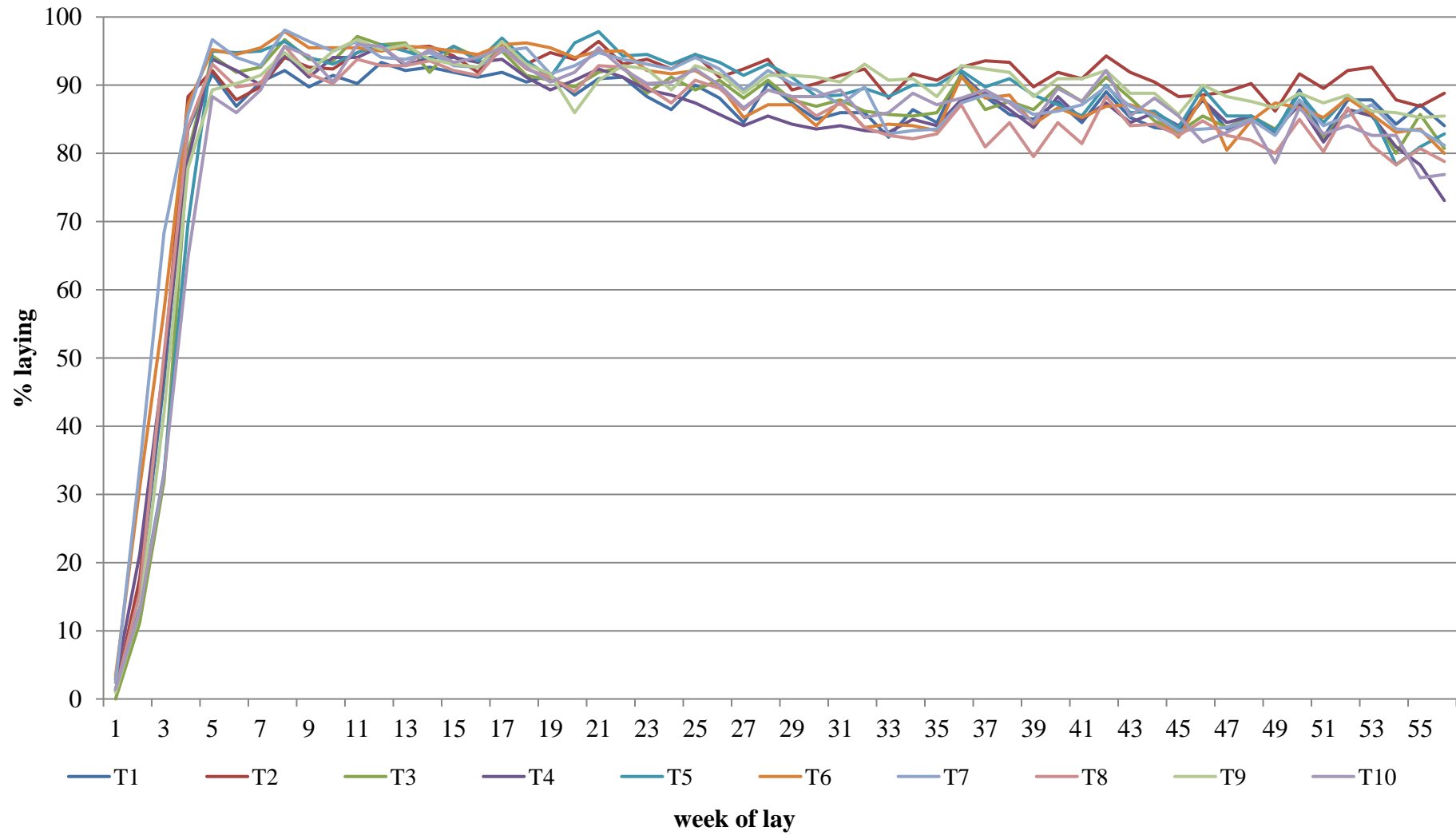
Treatment	Cross		Period													
	Way of rearing		1	2	3	4	5	6	7	8	9	10	11	12	13	14
6	T6	ø	49.71	56.32	58.96	60.40	60.69	61.21	62.06	61.82	62.16	61.78	62.31	62.48	62.89	63.40
		a	49.79	56.99	58.81	60.19	60.64	61.19	62.47	61.91	61.72	61.24	62.54	62.73	63.33	63.77
		b	48.85	56.47	59.03	60.44	60.19	60.90	61.69	61.80	62.08	61.70	62.03	62.32	62.83	63.40
		c	50.42	55.48	59.04	60.58	61.31	61.53	62.04	61.75	62.70	62.41	62.37	62.40	62.41	62.97
7	T7	ø	50.21	57.59	60.53	61.78	62.26	62.32	62.57	62.25	62.67	62.42	62.99	62.91	63.25	63.13
		a	51.05	58.10	60.38	61.22	61.45	61.85	61.33	60.43	61.18	61.46	61.46	61.79	62.70	62.48
		b	49.16	56.82	60.00	61.55	61.96	61.87	62.76	62.34	62.64	61.68	62.93	62.78	62.60	62.71
		c	50.74	58.24	62.08	63.29	64.53	64.16	64.72	65.47	65.60	65.75	65.95	65.71	65.80	65.82
8	T8	ø	51.92	58.59	60.87	62.34	62.41	62.87	63.75	63.26	62.68	62.95	63.51	63.00	63.75	63.28
		a	52.42	59.25	60.33	62.89	62.90	63.21	63.63	62.87	61.58	63.06	63.12	63.33	62.97	63.50
		b	51.82	58.47	61.22	61.76	61.80	62.22	63.42	63.02	62.66	62.27	62.94	62.35	63.10	62.83
		c	51.50	58.11	61.02	62.38	62.55	63.26	64.22	63.89	63.81	63.57	64.55	63.47	65.32	63.67
9	T9	ø	49.91	57.76	60.36	61.60	61.89	62.63	63.58	62.92	63.39	62.86	62.99	62.84	63.11	62.79
		a	50.92	58.11	60.25	61.04	61.06	61.79	63.15	62.55	62.32	62.08	62.28	62.52	62.60	62.27
		b	48.02	57.78	60.32	61.77	61.93	63.66	63.50	62.42	64.23	63.37	63.29	62.73	63.47	62.52
		c	50.38	57.36	60.51	61.99	62.62	62.40	64.06	63.83	63.62	63.04	63.38	63.29	63.24	63.54
10	T10	ø	51.41	59.51	62.82	64.08	63.69	64.62	65.57	65.18	64.94	65.17	65.56	65.67	65.75	66.03
		a	50.73	60.73	63.16	65.25	64.69	65.49	66.08	65.80	64.96	65.68	66.74	66.54	66.15	67.26
		b	50.93	58.48	62.42	62.70	63.18	64.07	64.69	63.92	64.52	64.24	64.37	64.68	64.79	64.86
		c	52.29	59.36	62.88	64.30	63.19	64.33	65.92	65.84	65.37	65.60	65.52	65.83	66.46	66.27

way of rearing: a - deep litter + beak trimming b - cages + beak trimming c - cages + non beak trimming

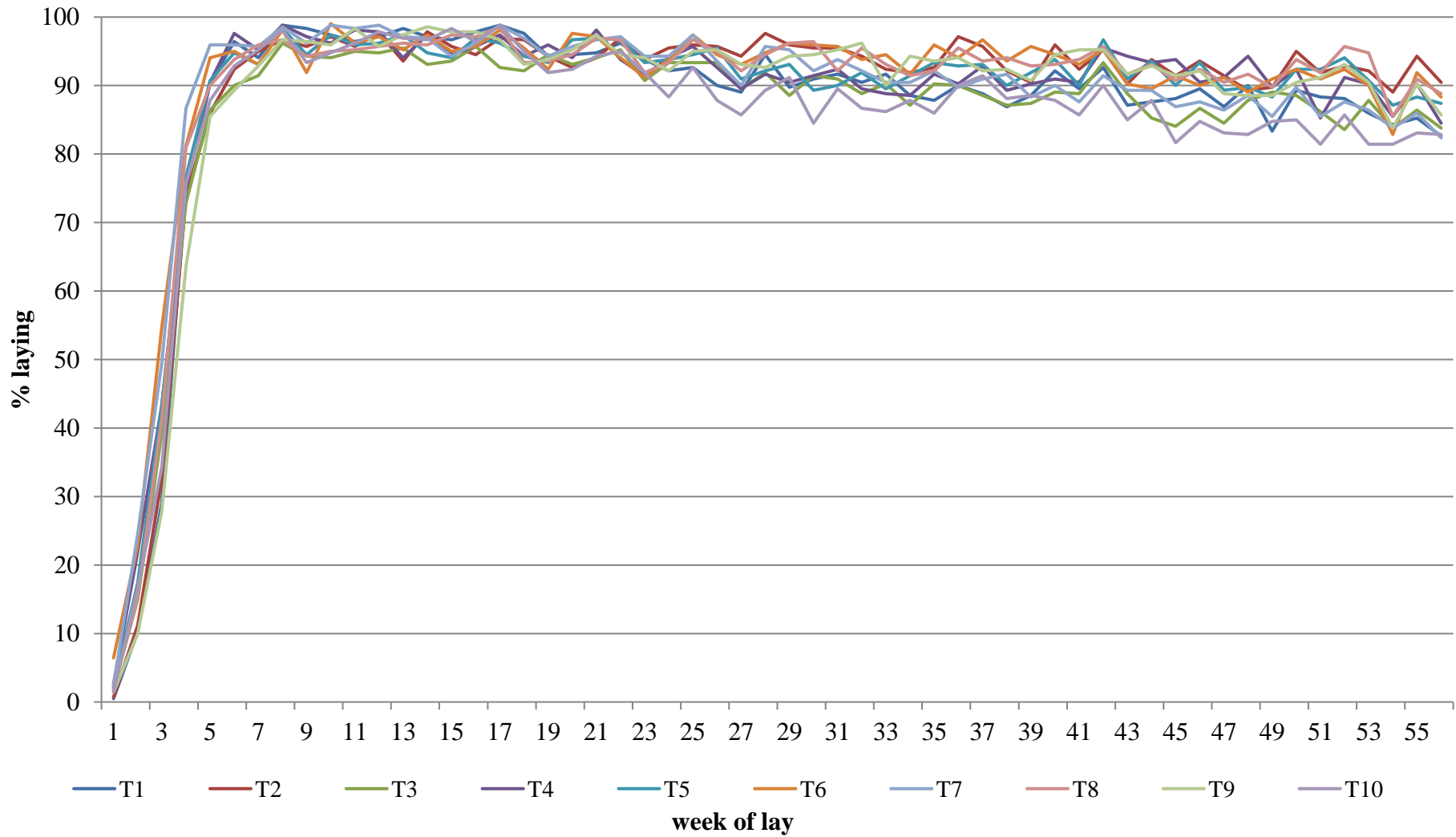
Graph no. 1: intenzity of laying (\emptyset)



Graph no. 2: intenzity of laying (way of rearing: a - deep litter + beak trimming)



Graph no. 3: intenzity of laying (way of rearing: b - cages + beak trimming)



Graph no. 4: intenzity of laying (way of rearing: c - cages + non beak trimming)

