



MEZINÁRODNÍ TESTOVÁNÍ DRŮBEŽE
státní podnik, ÚSTRAŠICE

390 02 Tábor 2

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

**The final report
2021 - 2022**

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1 The list of participants

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

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 12 genotypes compared in the test. Each sample consisted of 1080 hatching eggs delivered to the test station. (Only treatment No. 5 had 982 eggs and treatment No. 10 had 1062 eggs.)

2.4 Important dates

setting in the hatchery:	15 March 2021
beginning of rearing – day 1:	6 April 2021
end of rearing:	10 August 2021
beginning of laying. start of the period 1:	11 August 2021
end of laying. end of the period 14:	6 September 2022

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, 240 pullets of each sample were randomly chosen for the test. 80 pullets were placed in the house with deep litter system and 160 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	10 - 15
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

Diet formulas:

	K1 IT N	K2 IT N	KZK IT N	N0 IT N
Age	Week 1 - 4	Week 5 - 10	Week 11 - 16	Week 17 - 18
Feed form	crumbled	crushed	crushed	crushed
Components – content in %:				
Wheat	36.250	48.130	60.180	41.385
Maize	33.000	26.000	15.000	10.000
Extr. soybean groats	23.300	19.500	9.300	19.800
Barley	-	-	-	20.000
Wheat bran	-	-	6.000	-
Extr. sunflower groats	-	-	5.500	-
Extr. rapeseed groats	-	-	-	-
Fish meal	2.200	1.500	-	-
Soybean oil	1.100	-	-	1.500
Animal fat	-	0.700	-	-
Lysine-HCl	0.240	0.130	0.140	0.040
L-threonine	0.080	0.040	-	-
DL-methionine	0.220	0.160	0.080	0.170
Salt	0.360	0.350	0.360	0.320
Limestone	1.530	1.360	0.910	1.600
Limestone-roughly ground	-	-	0.910	3.730
MCP – monocalciumphosphate	1.530	1.920	1.400	0.970
Sodium bicarbonate	-	-	-	0.080
Vitamin and mineral supplement	0.190	0.210	0.220	0.405
Nutrient content (calculated values):				
CP (g/kg)	203.57	185.47	156.58	169.10
Fat (g/kg)	36.88	30.76	21.41	33.25
Linoleic acid (g/kg)	17.64	13.21	11.30	17.92
Crude fiber (g/kg)	27.81	28.47	39.12	33.41
ME (MJ/kg)	12.18	12.05	11.39	11.60
Lysine (g/kg)	11.54	9.54	7.12	8.27
Methionine (g/kg)	5.19	4.39	3.29	4.20
Met. + Cys. (g/kg)	8.60	7.65	6.36	7.37
Threonine (g/kg)	7.75	6.61	5.12	5.86
Tryptophan (g/kg)	2.43	2.22	1.86	2.16
Ca (g/kg)	10.50	10.10	10.28	23.00
P (g/kg)	7.93	8.56	7.65	5.87
P digest. (g/kg)	5.48	6.52	5.41	4.28
Vitamin A (IU/kg)	10842.15	10857.29	10819.48	10812.46
Vitamin D3 (IU/kg)	2080.00	2080.00	2080.00	2080.00

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		49.065	49.965	56.475
Extr. soybean groats		23.150	13.450	15.000
Maize		10.000	15.000	5.000
Sunflower meal		-	8.000	4.500
Wheat bran		2.700	-	4.000
Soybean oil		3.300	2.500	3.500
DL-methionine		0.190	0.150	0.150
Lysine-HCL		-	0.150	0.110
L-threonine		0,030	0.030	0.030
Salt		0.330	0.260	0.260
Limestone		2.740	2.750	2.900
Limestone-roughly ground		6.400	6.400	6.900
MCP - monocalciumphosphate		0.710	0.610	0.370
Sodium bicarbonate		0,080	0,150	0,150
Premix of vitamins, enzymes		1.305	0.585	0.655
Nutrient content (calculated values):				
Crude protein	g/kg	175.13	160.29	159.07
Fat	g/kg	49.70	43.21	51.08
Linoleic acid	g/kg	27.04	23.94	27.33
Crude fiber	g/kg	39.87	40.43	39.74
ME	MJ/kg	11.45	11.41	11.40
Lysine	g/kg	8.53	7.91	7.78
Methionine	g/kg	4.42	4.07	3.93
Meth. +cysteine	g/kg	7.59	7.05	6.91
Threonine	g/kg	6.37	5.75	5.65
Tryptophan	g/kg	2.26	1.93	2.00
Ca	g/kg	37.08	37.01	39.07
P	g/kg	5.38	5.14	4.76
P (digestible)	g/kg	3.70	3.44	3.09
Vitamin A	U.I./kg	10768.97	10739.67	10745.01
Vitamin D3	U.I./kg	2080.00	2080.00	2080.00

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), 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

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Tab. No. 11	Intensity of lay
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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	xxxxxx	56.58	93.42	86.94	93.06
2	xxxxxx	61.11	88.70	81.94	92.38
3	xxxxxx	55.56	95.09	87.50	92.02
4	xxxxxx	54.19	95.92	90.37	94.21
5	xxxxxx	58.04	92.57	83.10	89.77
6	xxxxxx	62.19	92.22	83.33	90.36
7	xxxxxx	58.68	93.05	85.37	91.74
8	xxxxxx	60.28	89.72	82.04	91.43
9	xxxxxx	60.88	92.12	84.54	91.76
10	xxxxxx	60.43	94.53	81.26	85.96
11	xxxxxx	57.93	96.38	87.22	90.49
12	xxxxxx	64.67	93.88	88.89	94.67

Results of rearing

Tab. No. 2

Page 1

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	xxxxxx	34.4	133.2	283.7	518.4	722.0	990.7	1166.0	1310.0	1438.0	1606.0	7.3
	cage system	34.4	131.4	291.3	540.7	756.0	1040.3	1144.0	1294.0	1443.0	1591.0	6.85
	deep litter system	34.5	135.0	276.0	496.0	688.0	941.0	1188.0	1326.0	1433.0	1621.0	7.79
2	xxxxxx	34.1	123.5	274.7	489.4	699.4	975.0	1111.5	1234.0	1346.8	1495.3	7.2
	cage system	34.0	123.5	274.6	473.7	735.7	1018.0	1111.0	1250.0	1353.5	1494.5	6.83
	deep litter system	34.2	123.5	274.8	505.0	663.0	932.0	1112.0	1218.0	1340.0	1496.0	7.62
3	xxxxxx	34.0	125.1	284.0	497.0	722.7	997.7	1150.9	1332.0	1431.3	1668.0	7.4
	cage system	34.1	128.4	294.7	511.0	769.3	1054.3	1127.7	1323.0	1416.5	1649.0	6.89
	deep litter system	33.9	121.8	273.3	483.0	676.0	941.0	1174.0	1341.0	1446.0	1687.0	7.85
4	xxxxxx	33.9	121.6	277.5	505.7	710.5	1009.5	1151.4	1315.5	1421.5	1629.0	7.3
	cage system	33.9	119.9	280.7	491.3	748.0	1069.0	1143.7	1318.0	1401.0	1621.0	6.88
	deep litter system	33.9	123.3	274.3	520.0	673.0	950.0	1159.0	1313.0	1442.0	1637.0	7.63
5	xxxxxx	35.8	131.7	292.4	514.2	725.9	1027.4	1175.2	1317.5	1438.5	1590.0	7.3
	cage system	35.2	132.3	302.3	509.3	761.7	1081.7	1185.3	1318.0	1426.0	1652.0	6.82
	deep litter system	36.5	131.0	282.5	519.0	690.0	973.0	1165.0	1317.0	1451.0	1528.0	7.75
6	xxxxxx	38.9	103.1	243.4	477.2	685.5	967.7	1091.4	1251.5	1380.0	1538.5	7.2
	cage system	38.8	96.8	252.8	454.3	698.0	1027.3	1073.7	1249.0	1374.0	1594.0	6.80
	deep litter system	39.0	109.3	234.0	500.0	673.0	908.0	1109.0	1254.0	1386.0	1483.0	7.60

Results of rearing

Tab. No. 2

Page 2

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	
7	xxxxx	35.1	126.4	277.6	502.2	704.9	975.2	1132.4	1264.4	1380.3	1535.3	7.4
	cage system	35.2	126.5	286.4	515.3	732.7	1039.3	1151.7	1284.7	1377.5	1582.5	6.83
	deep litter system	35.0	126.3	268.8	489.0	677.0	911.0	1113.0	1244.0	1383.0	1488.0	7.91
8	xxxxx	35.8	128.1	274.9	513.0	721.4	992.4	1117.0	1294.4	1411.5	1541.8	7.3
	cage system	35.3	122.7	281.9	493.0	745.7	1051.7	1105.0	1332.7	1417.0	1521.5	6.96
	deep litter system	36.3	133.5	268.0	533.0	697.0	933.0	1129.0	1256.0	1406.0	1562.0	7.62
9	xxxxx	37.1	102.6	253.5	471.2	691.2	976.5	1119.5	1281.9	1385.5	1547.3	7.2
	cage system	36.9	96.2	250.4	469.3	702.3	1017.0	1119.0	1299.7	1364.0	1557.5	6.83
	deep litter system	37.2	109.0	256.5	473.0	680.0	936.0	1120.0	1264.0	1407.0	1537.0	7.63
10	xxxxx	36.2	130.5	286.0	502.5	731.0	995.0	1126.5	1279.4	1378.8	1573.3	7.2
	cage system	36.2	126.7	287.9	500.0	758.0	1062.0	1147.0	1294.7	1384.5	1623.5	6.85
	deep litter system	36.2	134.3	284.0	505.0	704.0	928.0	1106.0	1264.0	1373.0	1523.0	7.51
11	xxxxx	36.0	129.3	277.9	504.9	705.4	1004.5	1144.9	1292.7	1385.5	1590.8	7.2
	cage system	35.9	128.2	280.7	504.7	731.7	1054.0	1157.7	1291.3	1368.0	1583.5	6.82
	deep litter system	36.0	130.3	275.0	505.0	679.0	955.0	1132.0	1294.0	1403.0	1598.0	7.55
12	xxxxx	41.1	138.9	291.9	526.0	728.0	1087.0	1270.0	1306.0	1439.0	1621.0	7.5
	cage system	41.1	138.9	291.9	526.0	728.0	1087.0	1270.0	1306.0	1439.0	1621.0	7.54

Mortality in rearing

Tab. No. 3

Page 1

Sample	Cross	Number of pullets			
		Initial flock	Final flock	Mortality	
		birds	birds	birds	%
1	xxxxx	240	235	5	2.08
	cage systém	160	158	2	1.25
	deep litter system	80	77	3	3.75
2	xxxxx	240	239	1	0.42
	cage systém	160	160	0	0.00
	deep litter system	80	79	1	1.25
3	xxxxx	240	233	7	2.92
	cage systém	160	157	3	1.88
	deep litter system	80	76	4	5.00
4	xxxxx	240	238	2	0.83
	cage systém	160	159	1	0.63
	deep litter system	80	79	1	1.25
5	xxxxx	240	235	5	2.08
	cage systém	160	158	2	1.25
	deep litter system	80	77	3	3.75
6	xxxxx	240	236	4	1.67
	cage systém	160	157	3	1.88
	deep litter system	80	79	1	1.25

Mortality in rearing

Tab. No. 3

Page 2

Sample	Cross	Number of pullets			
		Initial flock	Final flock	Mortality	
		birds	birds	birds	%
7	xxxxx	240	232	8	3.33
	cage systém	160	157	3	1.88
	deep litter system	80	75	5	6.25
8	xxxxx	240	234	6	2.50
	cage systém	160	155	5	3.13
	deep litter system	80	79	1	1.25
9	xxxxx	240	236	4	1.67
	cage systém	160	158	2	1.25
	deep litter system	80	78	2	2.50
10	xxxxx	240	240	0	0.00
	cage systém	160	160	0	0.00
	deep litter system	80	80	0	0.00
11	xxxxx	240	240	0	0.00
	cage systém	160	160	0	0.00
	deep litter system	80	80	0	0.00
12	xxxxx	80	76	4	5.00
	cage systém	80	76	4	5.00

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	XXXXX	ø	139	141	143	155	100.00	336.72	85.90	342.87	87.47	60.77	20.46	20.83
		a	140	141	143	153	100.00	331.18	84.49	341.85	87.21	60.56	20.06	20.70
		b	139	141	142	155	100.00	334.65	85.37	340.56	86.88	61.21	20.48	20.85
		c	138	140	141	153	100.00	344.33	87.84	346.14	88.30	60.51	20.83	20.94
2	XXXXX	ø	138	141	144	155	100.00	344.65	87.92	350.07	89.30	60.96	21.01	21.34
		a	140	143	146	155	100.00	345.55	88.15	348.13	88.81	61.59	21.28	21.44
		b	139	142	144	155	100.00	341.57	87.13	349.08	89.05	61.26	20.92	21.38
		c	136	139	140	149	100.00	346.83	88.48	353.03	90.06	60.03	20.82	21.19
3	XXXXX	ø	138	140	143	155	100.00	342.58	87.39	344.40	87.86	62.69	21.48	21.59
		a	138	142	144	155	100.00	346.50	88.39	348.29	88.85	63.21	21.90	22.01
		b	138	140	144	155	100.00	334.28	85.28	337.90	86.20	62.96	21.05	21.27
		c	138	140	142	152	100.00	346.95	88.51	346.95	88.51	61.95	21.50	21.50
4	XXXXX	ø	139	142	144	155	100.00	347.42	88.63	350.71	89.47	61.20	21.26	21.46
		a	141	143	144	155	100.00	344.82	87.96	349.18	89.08	61.76	21.30	21.56
		b	139	142	145	155	100.00	332.53	84.83	334.93	85.44	61.19	20.35	20.49
		c	139	141	143	149	100.00	364.90	93.09	368.03	93.89	60.70	22.15	22.34

way of rearing:

a - deep litter + beak trimming

b - cages + non beak trimming

c - cages + 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		
5	XXXXX	ø	139	142	144	155	100.00	343.92	87.73	345.38	88.11	62.98	21.66	21.75
		a	141	143	146	155	100.00	340.63	86.90	341.71	87.17	63.99	21.80	21.86
		b	139	141	143	152	100.00	338.60	86.38	338.60	86.38	62.71	21.23	21.23
		c	138	140	142	152	100.00	352.52	89.93	355.91	90.79	62.29	21.96	22.17
6	XXXXX	ø	140	143	145	160	100.00	341.52	87.12	343.88	87.72	61.87	21.13	21.28
		a	142	145	146	160	100.00	339.78	86.68	339.78	86.68	63.35	21.53	21.53
		b	141	143	147	155	100.00	337.07	85.99	344.03	87.76	62.15	20.95	21.38
		c	138	140	142	152	100.00	347.70	88.70	347.82	88.73	60.15	20.91	20.92
7	XXXXX	ø	139	141	144	155	100.00	334.96	85.45	344.49	87.88	62.49	20.93	21.53
		a	140	142	145	155	100.00	314.68	80.28	336.47	85.83	62.49	19.66	21.03
		b	139	142	144	155	100.00	339.20	86.53	343.09	87.52	63.51	21.54	21.79
		c	138	140	142	152	100.00	351.00	89.54	353.43	90.16	61.50	21.59	21.74
8	XXXXX	ø	139	143	147	155	100.00	344.10	87.78	350.46	89.40	61.66	21.22	21.61
		a	141	144	146	155	100.00	346.23	88.32	350.03	89.29	62.15	21.52	21.76
		b	140	142	147	155	100.00	338.37	86.32	347.44	88.63	61.59	20.84	21.40
		c	138	141	145	153	100.00	347.70	88.70	353.88	90.28	61.23	21.29	21.67

way of rearing:

a - deep litter + beak trimming

b - cages + non beak trimming

c - cages + beak trimming

Results of the egg yield

Tab. No. 4 (page 3)

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	
9	xxxxx	ø	139	143	145	155	100.00	343.22	87.56	343.91	87.73	61.29	21.04	21.08
		a	140	144	146	155	100.00	344.68	87.93	344.68	87.93	61.73	21.28	21.28
		b	139	143	143	155	100.00	342.72	87.43	344.75	87.95	61.22	20.98	21.11
		c	139	142	145	155	100.00	342.27	87.31	342.31	87.32	60.94	20.86	20.86
10	xxxxx	ø	139	141	144	155	100.00	331.36	84.53	342.05	87.26	61.80	20.48	21.14
		a	140	143	146	155	100.00	316.03	80.62	345.02	88.02	62.22	19.66	21.47
		b	139	142	145	155	100.00	342.10	87.27	344.16	87.80	61.63	21.08	21.21
		c	133	140	141	149	100.00	335.95	85.70	337.21	86.02	61.61	20.70	20.78
11	xxxxx	ø	138	142	143	155	100.00	334.73	85.39	342.48	87.37	61.22	20.49	20.97
		a	140	143	145	155	100.00	338.93	86.46	341.55	87.13	61.79	20.94	21.10
		b	138	141	143	155	100.00	321.90	82.12	336.21	85.77	61.08	19.66	20.54
		c	138	139	141	153	100.00	343.35	87.59	349.55	89.17	60.82	20.88	21.26
12	xxxxx	c	142	149	152	193	100.00	292.25	74.55	292.98	74.74	59.27	17.32	17.36

way of rearing: a - deep litter + beak trimming b - cages + non beak trimming c - cages + 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	XXXXX	ø	51.86	151.27	2.49	132.31
		a	51.73	151.32	2.50	131.96
		b	52.11	153.02	2.50	132.94
		c	51.75	149.51	2.47	132.02
2	XXXXX	ø	52.68	150.48	2.47	134.39
		a	52.26	150.12	2.44	133.32
		b	54.00	154.69	2.53	137.75
		c	51.79	146.69	2.44	132.11
3	XXXXX	ø	51.09	148.34	2.37	130.33
		a	50.82	145.91	2.31	129.64
		b	51.81	153.31	2.44	132.16
		c	50.65	145.98	2.36	129.20
4	XXXXX	ø	52.14	148.68	2.43	133.02
		a	51.78	148.30	2.40	132.10
		b	51.19	152.83	2.50	130.58
		c	53.46	145.26	2.39	136.38

way of rearing:

a - deep litter + beak trimming

b - cages + non beak trimming

c - cages + 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
5	XXXXX	ø	51.04	147.80	2.35	130.22
		a	50.70	148.38	2.32	129.34
		b	51.64	152.51	2.43	131.73
		c	50.79	142.71	2.29	129.57
6	XXXXX	ø	51.58	150.00	2.42	131.59
		a	50.39	148.30	2.34	128.55
		b	52.46	152.50	2.45	133.84
		c	51.91	149.24	2.48	132.42
7	XXXXX	ø	52.49	152.38	2.44	133.91
		a	54.46	161.85	2.59	138.93
		b	52.36	152.60	2.40	133.56
		c	50.78	143.68	2.34	129.54
8	XXXXX	ø	51.94	148.21	2.40	132.51
		a	50.82	145.20	2.34	129.65
		b	53.48	153.92	2.50	136.43
		c	51.55	145.66	2.38	131.50

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

Feed consumption

Tab. No. 5 (page 3)

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
9	xxxxx	ø	52.09	151.47	2.47	132.89
		a	51.53	149.50	2.42	131.45
		b	51.72	150.01	2.45	131.93
		c	53.03	154.91	2.54	135.28
10	xxxxx	ø	52.73	154.15	2.49	134.50
		a	54.32	157.44	2.53	138.57
		b	51.84	150.64	2.44	132.26
		c	52.14	154.62	2.51	133.01
11	xxxxx	ø	51.72	151.01	2.47	131.93
		a	51.06	149.50	2.42	130.26
		b	52.89	157.30	2.58	134.92
		c	51.24	146.59	2.41	130.72
12	xxxxx	c	53.10	181.25	3.06	135.47

way of rearing: a - deep litter + beak trimming b - cages + non beak trimming c - cages + 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 30	final live weight
1	XXXXX	ø	1800.0	1819.3	1866.7	1842.0	1923.3	2148.4
		a	1796	1810	1852	1839	1904	2221.1
		b	1832	1869	1852	1820	1905	2128.4
		c	1772	1779	1896	1867	1961	2098.6
2	XXXXX	ø	1717.3	1791.3	1764.7	1723.3	1808.0	2122.7
		a	1746	1839	1741	1782	1841	2173.9
		b	1729	1807	1813	1713	1888	2084.3
		c	1677	1728	1740	1675	1695	2108.6
3	XXXXX	ø	1876.0	1950.7	1955.0	1877.0	1992.3	2148.7
		a	1905	1978	1951	1963	2050	2230.2
		b	1915	1971	1915	1831	1987	2122.3
		c	1808	1903	1999	1837	1940	2107.1
4	XXXXX	ø	1828.0	1861.0	1938.0	1835.7	1908.7	2145.7
		a	1843	1905	1972	1930	1939	2222.5
		b	1791	1804	1880	1764	1924	2175.1
		c	1850	1874	1962	1813	1863	2086.4

way of rearing: a - deep litter + beak trimming b - cages + non beak trimming c - cages + 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 30	final live weight
5	XXXXX	ø	1783.3	1845.3	1893.3	1820.3	1902.3	2137.5
		a	1719	1858	1806	1791	1864	2117.3
		b	1836	1860	1875	1764	1938	2234.6
		c	1795	1818	1999	1906	1905	2118.3
6	XXXXX	ø	1795.7	1891.0	1882.7	1852.3	1964.0	2243.4
		a	1762	1857	1848	1811	1959	2327.8
		b	1843	2010	1949	1925	2012	2319.9
		c	1782	1806	1851	1821	1921	2162.5
7	XXXXX	ø	1765.3	1854.3	1877.0	1826.3	1900.3	2112.4
		a	1690	1831	1836	1735	1828	2102.3
		b	1820	1952	1939	1828	1958	2067.0
		c	1786	1780	1856	1916	1915	2180.6
8	XXXXX	ø	1765.7	1828.7	1830.3	1821.0	1884.3	2142.2
		a	1823	1919	1923	1923	1982	2147.2
		b	1795	1779	1787	1731	1880	2117.6
		c	1679	1788	1781	1809	1791	2174.6

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

Live weight of laying hens

Tab. No. 6 (page 3)

Treatment	Cross		Live weight (g)					
	Way of rearing		week 20	week 22	week 24	week 26	week 30	final live weight
9	xxxxx	ø	1824.7	1874.7	1909.3	1794.3	1923.0	2238.0
		a	1830	1872	1872	1759	1941	2283.2
		b	1836	1861	1958	1787	1951	2233.2
		c	1808	1891	1898	1837	1877	2196.7
10	xxxxx	ø	1752.0	1877.7	1858.0	1805.3	1911.0	2143.1
		a	1757	1887	1848	1801	1961	2275.5
		b	1784	1868	1846	1743	1866	2027.5
		c	1715	1878	1880	1872	1906	2138.3
11	xxxxx	ø	1762.7	1817.0	1844.7	1795.0	1856.3	2053.3
		a	1785	1836	1867	1801	1956	2053.4
		b	1740	1746	1847	1787	1799	1986.0
		c	1763	1869	1820	1797	1814	2118.1
12	xxxxx	c	1845.0	1949.0	2073.0	1843.0	1994.0	2281.8

way of rearing: a - deep litter + beak trimming b - cages + non beak trimming c - cages + 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	XXXXX	ø	180	167	13	7.22									2		10	1			
		a	60	55	5	8.33											4	1			
		b	60	53	7	11.67									2		5				
		c	60	59	1	1.67											1				
2	XXXXX	ø	180	172	8	4.44									2		6				
		a	60	58	2	3.33									1		1				
		b	60	56	4	6.67									1		3				
		c	60	58	2	3.33											2				
3	XXXXX	ø	180	173	7	3.89									4		3				
		a	60	55	5	8.33									4		1				
		b	60	58	2	3.33											2				
		c	60	60	0	0.00															
4	XXXXX	ø	180	172	8	4.44									2		6				
		a	60	58	2	3.33									1		1				
		b	60	55	5	8.33									1		4				
		c	60	59	1	1.67											1				

way of rearing: a - deep litter + beak trimming b - cages + non beak trimming c - cages + 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			
	Way of rearing		Birds	Birds	Birds	%																		
5	XXXXX	ø	180	178	2	1.11														2				
		a	60	59	1	1.67														1				
		b	60	60	0	0.00																		
		c	60	59	1	1.67															1			
6	XXXXX	ø	180	175	5	2.78									2					3				
		a	60	60	0	0.00																		
		b	60	56	4	6.67										1				3				
		c	60	59	1	1.67										1								
7	XXXXX	ø	180	166	14	7.78		1				2			2					7	2			
		a	60	51	9	15.00						1			1					5	2			
		b	60	58	2	3.33		1							1									
		c	60	57	3	5.00						1									2			
8	XXXXX	ø	180	167	13	7.22									6					7				
		a	60	57	3	5.00									2					1				
		b	60	53	7	11.67									2					5				
		c	60	57	3	5.00									2					1				

way of rearing: a - deep litter + beak trimming b - cages + non beak trimming c - cages + 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			
	Way of rearing		Birds	Birds	Birds	%																		
9	XXXXX	ø	180	177	3	1.67																		
		a	60	60	0	0.00																		
		b	60	58	2	3.33																		
		c	60	59	1	1.67																		
10	XXXXX	ø	180	166	14	7.78						1								4	5			
		a	60	51	9	15.00															1	3	5	
		b	60	56	4	6.67																3	1	
		c	60	59	1	1.67							1											
11	XXXXX	ø	180	165	15	8.33						2	1								2	9	1	
		a	60	57	3	5.00								1								1	1	
		b	60	53	7	11.67																1	5	1
		c	60	55	5	8.33							2										3	
12	XXXXX	c	60	59	1	1.67																1		

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

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	XXXXX	ø	60610	2561	4.23	1923	3.17	2	0.00	500	0.82	4986	8.23
		a	19871	946	4.76	793	3.99	2	0.01	158	0.80	1899	9.56
		b	20079	755	3.76	528	2.63	0	0.00	159	0.79	1442	7.18
		c	20660	860	4.16	602	2.91	0	0.00	183	0.89	1645	7.96
2	XXXXX	ø	62037	2792	4.50	1933	3.12	1	0.00	514	0.83	5240	8.45
		a	20733	1031	4.97	703	3.39	0	0.00	148	0.71	1882	9.08
		b	20494	846	4.13	609	2.97	1	0.00	194	0.95	1650	8.05
		c	20810	915	4.40	621	2.98	0	0.00	172	0.83	1708	8.21
3	XXXXX	ø	61664	2741	4.45	1961	3.18	1	0.00	613	0.99	5316	8.62
		a	20790	1046	5.03	693	3.33	0	0.00	250	1.20	1989	9.57
		b	20057	822	4.10	621	3.10	0	0.00	193	0.96	1636	8.16
		c	20817	873	4.19	647	3.11	1	0.00	170	0.82	1691	8.12
4	XXXXX	ø	62535	2663	4.26	1869	2.99	8	0.01	606	0.97	5146	8.23
		a	20689	978	4.73	703	3.40	1	0.00	210	1.02	1892	9.14
		b	19952	901	4.52	622	3.12	4	0.02	240	1.20	1767	8.86
		c	21894	784	3.58	544	2.48	3	0.01	156	0.71	1487	6.79

way of rearing: a - deep litter + beak trimming b - cages + non beak trimming c - cages + 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	%
5	XXXXX	ø	61905	2574	4.16	1807	2.92	1	0.00	550	0.89	4932	7.97
		a	20438	992	4.85	694	3.40	0	0.00	203	0.99	1889	9.24
		b	20316	847	4.17	595	2.93	0	0.00	189	0.93	1631	8.03
		c	21151	735	3.48	518	2.45	1	0.00	158	0.75	1412	6.68
6	XXXXX	ø	61473	2631	4.28	1833	2.98	4	0.01	510	0.83	4978	8.10
		a	20387	943	4.63	647	3.17	1	0.00	199	0.98	1790	8.78
		b	20224	770	3.81	594	2.94	2	0.01	113	0.56	1479	7.31
		c	20862	918	4.40	592	2.84	1	0.00	198	0.95	1709	8.19
7	XXXXX	ø	60293	2359	3.91	1767	2.93	4	0.01	585	0.97	4715	7.82
		a	18881	750	3.97	567	3.00	1	0.01	166	0.88	1484	7.86
		b	20352	788	3.87	547	2.69	3	0.01	192	0.94	1530	7.52
		c	21060	821	3.90	653	3.10	0	0.00	227	1.08	1701	8.08
8	XXXXX	ø	61938	2718	4.39	1896	3.06	4	0.01	570	0.92	5188	8.38
		a	20774	931	4.48	634	3.05	4	0.02	189	0.91	1758	8.46
		b	20302	916	4.51	613	3.02	0	0.00	177	0.87	1706	8.40
		c	20862	871	4.18	649	3.11	0	0.00	204	0.98	1724	8.26

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

Second quality eggs

Tab. No. 8 (page 3)

Treatment	Cross		Eggs laid	Cracked		Broken eggs		Double-yolked		Membranes		Nonstandard together	
	Way of rearing		number	number	%	number	%	number	%	number	%	number	%
9	XXXXX	ø	61780	2853	4.62	1919	3.11	7	0.01	562	0.91	5341	8.65
		a	20681	1060	5.13	661	3.20	3	0.01	228	1.10	1952	9.44
		b	20563	872	4.24	649	3.16	0	0.00	141	0.69	1662	8.08
		c	20536	921	4.48	609	2.97	4	0.02	193	0.94	1727	8.41
10	XXXXX	ø	59645	2651	4.44	1893	3.17	6	0.01	553	0.93	5103	8.56
		a	18962	967	5.10	658	3.47	1	0.01	188	0.99	1814	9.57
		b	20526	869	4.23	645	3.14	4	0.02	182	0.89	1700	8.28
		c	20157	815	4.04	590	2.93	1	0.00	183	0.91	1589	7.88
11	XXXXX	ø	60251	2738	4.54	1801	2.99	5	0.01	575	0.95	5119	8.50
		a	20336	1012	4.98	626	3.08	2	0.01	262	1.29	1902	9.35
		b	19314	866	4.48	616	3.19	2	0.01	152	0.79	1636	8.47
		c	20601	860	4.17	559	2.71	1	0.00	161	0.78	1581	7.67
12	XXXXX	c	17535	787	4.49	629	3.59	0	0.00	168	0.96	1584	9.03

way of rearing: a - deep litter + beak trimming b - cages + non beak trimming c - cages + 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	XXXXX	ø	60.77	1.53	23.85	71.81	2.82
		a	60.56	1.58	22.41	73.50	2.51
		b	61.21	1.09	27.89	69.15	1.87
		c	60.51	1.92	21.18	72.85	4.05
2	XXXXX	ø	60.96	0.96	26.74	69.35	2.95
		a	61.59	1.30	30.58	65.66	2.45
		b	61.26	1.21	29.66	66.50	2.63
		c	60.03	0.36	20.00	75.89	3.75
3	XXXXX	ø	62.69	4.23	34.74	59.55	1.47
		a	63.21	5.82	36.70	56.50	0.98
		b	62.96	3.58	37.72	56.95	1.74
		c	61.95	3.36	30.02	64.93	1.68
4	XXXXX	ø	61.20	1.87	27.40	68.33	2.41
		a	61.76	2.31	30.86	65.04	1.79
		b	61.19	1.93	26.19	69.35	2.52
		c	60.70	1.39	25.30	70.42	2.89

way of rearing: a - deep litter + beak trimming b - cages + non beak trimming c - cages + 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	%	%	%	%
5	XXXXX	ø	62.98	2.99	40.58	54.83	1.61
		a	63.99	3.57	49.97	44.69	1.76
		b	62.71	2.81	37.63	58.06	1.51
		c	62.29	2.61	34.59	61.25	1.55
6	XXXXX	ø	61.87	1.92	32.44	63.50	2.14
		a	63.35	2.47	41.69	54.66	1.18
		b	62.15	2.51	35.90	59.03	2.56
		c	60.15	0.78	19.97	76.60	2.65
7	XXXXX	ø	62.49	2.83	35.29	59.65	2.23
		a	62.49	2.54	34.16	61.33	1.97
		b	63.51	3.15	42.15	53.62	1.08
		c	61.50	2.77	29.57	64.08	3.58
8	XXXXX	ø	61.66	2.39	30.40	64.00	3.21
		a	62.15	2.47	34.38	59.61	3.55
		b	61.59	2.69	28.92	65.08	3.31
		c	61.23	2.02	27.93	67.27	2.78

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

Weight classes of eggs

Tab. No. 9 (page 3)

Treatment	Cross		Egg weight	XL	L	M	S
				(= > 73 g)	(63 - 73 g)	(53 - 63 g)	(= < 53 g)
	Way of rearing		g	%	%	%	%
9	XXXXX	ø	61.29	0.97	28.51	67.88	2.64
		a	61.73	0.85	30.19	66.95	2.01
		b	61.22	0.78	30.54	65.11	3.57
		c	60.94	1.29	24.87	71.52	2.32
10	XXXXX	ø	61.80	2.83	31.23	62.99	2.95
		a	62.22	2.83	31.41	64.49	1.27
		b	61.63	2.34	32.50	61.89	3.27
		c	61.61	3.32	29.77	62.75	4.16
11	XXXXX	ø	61.22	1.52	26.74	68.88	2.85
		a	61.79	1.34	30.92	65.11	2.63
		b	61.08	1.31	25.11	71.33	2.24
		c	60.82	1.90	24.27	70.19	3.64
12	XXXXX	c	59.27	3.07	18.90	65.20	12.82

way of rearing: a - deep litter + beak trimming b - cages + non beak trimming c - cages + 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	xxxxxx	60.51	18.17	44.03	1.29	0.34	78.70	-4.17	4.6	10.4	12.50	58.20	20.9	30.8	0
2	xxxxxx	60.42	17.68	41.73	1.29	0.32	76.77	-5.67	5.3	9.2	13.23	56.27	20.3	29.4	0
3	xxxxxx	63.31	17.97	45.92	1.29	0.36	78.27	-3.43	4.7	10.9	12.33	57.33	20.5	30.3	1
4	xxxxxx	62.13	18.30	43.58	1.28	0.35	77.87	-3.53	4.5	11.0	12.30	58.50	20.2	29.3	0
5	xxxxxx	62.91	17.59	47.66	1.28	0.34	79.17	-4.90	5.1	10.0	12.97	57.17	19.2	29.2	0
6	xxxxxx	62.82	17.90	44.39	1.27	0.33	84.17	-3.60	4.6	10.9	12.33	60.37	19.0	29.8	0
7	xxxxxx	61.61	17.56	46.46	1.29	0.33	76.60	-3.47	4.7	10.9	12.37	58.27	21.3	30.9	0
8	xxxxxx	64.00	18.63	44.94	1.28	0.36	78.23	-4.57	4.8	10.1	12.60	58.50	20.0	29.8	0
9	xxxxxx	61.90	17.74	40.94	1.28	0.35	86.47	-3.33	4.7	11.2	12.40	60.33	19.1	29.3	0
10	xxxxxx	62.48	18.18	44.87	1.29	0.35	78.63	-2.70	4.8	11.7	12.13	56.73	21.7	30.4	1
11	xxxxxx	60.61	18.26	42.08	1.28	0.35	78.50	-2.97	4.7	11.3	12.23	58.63	19.7	29.8	0
12	xxxxxx	58.63	18.69	39.28	1.30	0.32	75.40	-3.63	4.7	10.9	12.50	73.43	0.3	17.9	0

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	xxxxxx	60.30	17.61	41.77	1.31	0.34	69.73	0.30	0.4	13.8	6.97	53.43	18.2	28.2	0
2	xxxxxx	61.97	18.11	43.11	1.29	0.35	69.90	-1.57	0.9	12.2	7.97	54.13	19.5	27.7	0
3	xxxxxx	64.00	18.62	44.87	1.32	0.36	71.83	-2.13	1.1	11.8	8.13	52.10	18.3	27.2	0
4	xxxxxx	62.88	18.98	41.92	1.29	0.36	69.57	-0.83	0.7	13.0	7.33	51.10	17.5	26.3	0
5	xxxxxx	64.02	18.31	40.72	1.32	0.37	70.03	-2.00	1.2	12.0	8.30	56.10	17.3	27.4	0
6	xxxxxx	61.61	18.09	40.17	1.31	0.35	79.70	-1.50	1.1	12.2	8.27	59.70	18.5	29.2	1
7	xxxxxx	64.01	18.84	40.91	1.32	0.35	71.40	-1.30	0.9	12.5	7.50	56.37	19.0	28.9	0
8	xxxxxx	62.97	18.82	45.61	1.28	0.39	75.77	-0.63	0.9	13.1	7.87	60.03	19.4	30.8	2
9	xxxxxx	60.95	18.48	46.46	1.30	0.38	77.20	1.43	0.4	14.6	6.90	61.87	19.0	30.0	2
10	xxxxxx	61.00	18.77	44.21	1.31	0.39	70.57	1.40	0.8	14.6	7.30	58.40	20.8	29.5	3
11	xxxxxx	61.60	18.76	42.68	1.31	0.39	68.13	2.27	0.2	15.4	6.47	62.40	18.3	27.5	4
12	xxxxxx	60.66	20.15	40.33	1.32	0.35	67.77	0.50	0.4	13.9	6.70	77.27	-0.3	18.2	0

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	xxxxxx	62.77	17.75	39.84	1.32	0.34	79.10	-2.53	2.1	11.5	9.87	58.33	18.6	29.1	4
2	xxxxxx	61.65	18.34	31.93	1.32	0.33	79.43	-5.10	2.8	9.4	11.20	57.73	19.1	28.5	2
3	xxxxxx	64.76	18.37	35.74	1.32	0.33	81.07	-4.30	2.7	10.1	11.00	58.17	18.9	29.1	0
4	xxxxxx	63.30	18.46	41.09	1.33	0.36	77.43	-3.10	2.3	11.1	10.07	57.97	19.3	28.8	5
5	xxxxxx	65.41	18.45	35.86	1.31	0.36	82.83	-4.37	2.4	10.0	10.30	60.40	17.6	27.0	3
6	xxxxxx	62.74	18.04	37.50	1.30	0.37	77.83	-1.93	2.0	12.1	9.47	58.80	18.6	28.4	0
7	xxxxxx	63.88	17.78	36.08	1.33	0.35	73.63	-1.70	1.9	12.3	9.57	58.33	19.0	28.9	2
8	xxxxxx	62.50	18.50	38.07	1.29	0.37	73.67	-2.73	2.1	11.4	9.83	56.83	19.0	29.4	0
9	xxxxxx	63.09	18.54	33.63	1.30	0.35	77.97	-0.93	1.7	12.8	8.93	60.07	18.1	28.3	1
10	xxxxxx	62.94	18.51	35.47	1.33	0.34	68.53	-0.50	1.5	13.2	8.67	58.93	18.6	28.7	1
11	xxxxxx	61.53	18.28	36.39	1.29	0.36	65.27	-0.23	1.6	13.5	8.77	60.30	18.2	28.3	1
12	xxxxxx	63.86	20.93	31.34	1.32	0.34	58.93	-0.73	1.7	13.1	8.90	75.53	1.0	18.1	0

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	xxxxx	ø	60.26	91.67	91.37	93.45	93.53	92.36	90.93	90.16	85.48	84.01	85.06	83.69	80.30	80.32
		a	57.44	90.12	91.19	94.17	92.74	90.24	88.27	87.08	84.52	84.35	85.71	81.37	77.26	78.33
		b	59.52	90.89	91.79	93.10	94.46	95.00	93.39	92.20	84.23	81.37	80.95	81.31	79.29	77.68
		c	63.81	93.99	91.13	93.10	93.39	91.85	91.13	91.19	87.68	86.31	88.51	88.39	84.35	84.94
2	xxxxx	ø	59.05	94.25	93.45	95.20	94.64	93.33	92.20	90.75	86.25	86.79	88.97	87.74	83.93	84.35
		a	52.62	94.88	93.51	95.00	95.30	93.75	92.86	91.49	86.49	87.62	89.23	88.57	87.02	85.77
		b	57.98	92.44	92.44	94.46	93.15	93.51	92.32	91.13	86.96	86.96	88.63	86.90	82.08	80.89
		c	66.55	95.42	94.40	96.13	95.48	92.74	91.43	89.64	85.30	85.77	89.05	87.74	82.68	86.37
3	xxxxx	ø	60.10	91.25	91.41	93.10	93.37	93.87	92.56	91.90	89.38	88.91	89.25	85.12	82.58	80.69
		a	58.27	88.99	91.73	94.40	94.88	96.55	94.35	92.20	92.38	91.01	92.50	87.32	83.45	79.46
		b	58.04	93.33	89.29	89.82	91.19	91.96	90.24	89.52	87.14	87.20	85.54	81.73	80.24	78.63
		c	63.99	91.43	93.21	95.06	94.05	93.10	93.10	93.99	88.63	88.51	89.70	86.31	84.05	83.99
4	xxxxx	ø	56.53	95.22	94.31	96.09	95.40	95.93	93.53	94.38	90.20	88.87	89.88	85.08	83.41	81.94
		a	52.38	93.93	93.27	96.01	95.95	96.73	93.15	93.69	91.25	89.64	89.82	85.00	82.02	78.63
		b	55.18	93.21	91.07	92.74	91.67	92.68	89.70	91.01	85.89	85.24	85.71	78.15	78.27	77.08
		c	62.02	98.51	98.57	99.52	98.57	98.39	97.74	98.45	93.45	91.73	94.11	92.08	89.94	90.12

way of rearing: a - deep litter + beak trimming b - cages + non beak trimming c - cages + 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
5	xxxxx	ø	56.69	93.91	93.19	95.10	94.44	93.93	91.88	91.37	85.87	86.69	89.70	86.39	85.16	83.95
		a	46.55	91.07	92.44	93.45	93.21	93.27	92.74	91.61	86.61	88.21	88.99	88.87	85.71	83.81
		b	59.82	94.88	91.19	94.58	93.93	94.17	91.07	90.30	82.14	83.99	88.45	80.77	83.63	80.36
		c	63.69	95.77	95.95	97.26	96.19	94.35	91.85	92.20	88.87	87.86	91.67	89.52	86.13	87.68
6	xxxxx	ø	51.71	93.41	93.85	93.69	93.55	94.17	92.56	91.37	86.73	85.22	89.37	86.31	84.66	83.12
		a	43.10	89.40	90.77	91.31	93.33	94.29	92.14	91.61	89.05	87.68	89.64	87.08	87.50	86.61
		b	49.82	95.83	94.82	95.06	94.11	93.27	92.62	90.95	84.40	80.36	86.37	85.00	81.43	79.76
		c	62.20	95.00	95.95	94.70	93.21	94.94	92.92	91.55	86.73	87.62	92.08	86.85	85.06	82.98
7	xxxxx	ø	56.77	92.80	93.13	94.40	94.50	91.73	89.82	89.66	83.37	84.27	85.75	82.08	78.87	79.13
		a	51.37	89.82	89.52	91.73	91.79	85.83	84.35	83.39	79.40	80.89	77.92	74.94	71.07	71.85
		b	54.35	93.27	93.99	95.54	96.07	95.30	93.15	91.37	80.36	80.54	87.44	84.88	82.80	82.38
		c	64.58	95.30	95.89	95.95	95.65	94.05	91.96	94.23	90.36	91.37	91.90	86.43	82.74	83.15
8	xxxxx	ø	52.68	95.10	94.96	96.11	95.40	95.22	93.02	91.71	86.53	86.23	89.74	85.24	83.81	83.19
		a	48.33	94.76	93.75	95.95	93.75	93.21	91.79	91.73	89.17	88.63	91.01	88.21	87.62	88.63
		b	51.31	95.24	95.54	95.36	97.26	97.08	95.48	91.67	83.87	83.21	86.31	81.31	79.52	75.30
		c	58.39	95.30	95.60	97.02	95.18	95.36	91.79	91.73	86.55	86.85	91.90	86.19	84.29	85.65

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

Laying intensity

Tab. No. 11 (page 3)

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
9	xxxxx	ø	52.40	94.03	93.63	95.28	94.11	94.54	91.65	91.57	85.46	86.05	90.46	86.55	85.00	85.08
		a	49.46	93.27	92.44	95.06	94.52	93.63	91.25	92.08	86.61	87.80	91.67	88.69	86.79	87.74
		b	54.23	95.12	93.69	95.06	93.81	95.12	92.92	92.32	84.46	87.26	89.35	85.00	84.58	81.07
		c	53.51	93.69	94.76	95.71	93.99	94.88	90.77	90.30	85.30	83.10	90.36	85.95	83.63	86.43
10	xxxxx	ø	58.00	93.79	94.19	95.28	93.00	90.97	88.02	87.88	80.54	80.30	83.81	82.24	79.13	76.31
		a	51.07	89.76	93.21	94.17	89.70	85.77	81.85	82.62	78.21	78.04	78.57	77.56	74.70	73.45
		b	57.14	95.65	95.48	97.14	96.79	95.42	93.93	92.68	79.70	80.00	87.44	88.39	84.29	77.74
		c	65.77	95.95	93.87	94.52	92.50	91.73	88.27	88.33	83.69	82.86	85.42	80.77	78.39	77.74
11	xxxxx	ø	60.10	93.69	94.42	95.79	93.61	93.71	91.61	91.11	83.25	81.11	82.14	79.23	77.50	78.17
		a	55.24	91.25	92.62	94.64	92.38	92.26	91.19	91.13	87.56	86.25	86.43	81.31	83.45	84.76
		b	60.18	92.86	95.83	95.24	93.21	94.46	89.94	90.06	76.73	70.42	75.06	74.82	69.70	71.13
		c	64.88	96.96	94.82	97.50	95.24	94.40	93.69	92.14	85.48	86.67	84.94	81.55	79.35	78.63
12	xxxxx	c	32.02	86.90	92.26	93.21	90.48	84.76	80.60	67.92	55.65	62.26	78.51	77.26	70.95	70.95

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

Average weight of eggs
in four weeks long periods (g)

Tab. No. 12 (page 1)

Treatment	Cross		Period													
	Way of rearing		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	XXXXX	ø	49.60	58.07	59.59	61.43	61.58	62.01	62.23	61.26	60.36	61.67	61.17	63.53	62.60	62.54
		a	50.26	58.05	59.74	61.75	61.45	61.78	62.41	61.43	60.83	61.06	61.13	62.90	60.87	60.90
		b	49.55	57.65	59.68	61.09	62.00	62.17	62.43	61.59	60.71	62.66	62.04	64.31	64.41	63.83
		c	49.04	58.49	59.36	61.46	61.27	62.08	61.84	60.77	59.58	61.25	60.29	63.36	62.65	62.60
2	XXXXX	ø	50.56	58.66	59.64	61.06	61.77	62.06	62.55	61.15	60.80	61.63	61.85	63.45	62.65	62.36
		a	51.24	59.43	60.20	62.13	62.32	62.19	62.99	61.35	61.56	62.53	62.40	63.97	63.24	62.67
		b	49.94	58.76	60.25	61.01	61.91	62.88	62.44	61.64	60.98	62.20	62.28	63.49	63.16	63.15
		c	50.53	57.81	58.48	60.00	61.09	61.05	62.22	60.45	59.93	60.13	60.83	62.88	61.63	61.21
3	XXXXX	ø	50.64	59.59	61.34	63.57	63.31	63.66	64.18	63.63	62.45	63.49	63.83	65.48	64.95	63.94
		a	50.56	60.34	62.21	64.72	63.72	64.33	64.51	63.89	63.36	63.56	63.53	66.07	66.11	63.54
		b	52.05	59.11	61.54	63.55	63.78	64.08	64.45	63.70	62.83	63.96	64.00	65.41	65.30	64.62
		c	49.39	59.38	60.27	62.59	62.48	62.59	63.63	63.33	61.24	62.91	63.99	65.00	63.63	63.56
4	XXXXX	ø	49.27	58.32	59.39	61.50	62.10	62.30	62.26	61.88	61.36	62.03	62.09	63.94	63.33	63.14
		a	50.48	58.66	59.57	61.89	62.21	62.37	62.91	62.70	62.28	62.66	62.25	65.00	63.88	63.68
		b	49.25	57.74	60.06	61.30	62.06	62.39	62.26	61.89	61.79	62.27	61.77	63.36	63.74	63.21
		c	48.27	58.55	58.59	61.32	62.02	62.14	61.68	61.16	60.07	61.27	62.24	63.31	62.48	62.60

way of rearing: a - deep litter + beak trimming b - cages + non beak trimming c - cages + 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
5	xxxxx	ø	52.56	60.22	61.31	63.00	63.59	63.85	64.21	63.39	63.25	64.00	63.66	65.29	65.36	64.65
		a	52.89	61.03	62.32	64.06	64.59	64.50	65.47	64.08	64.36	64.76	65.24	66.74	66.00	64.62
		b	52.47	59.44	60.81	62.88	63.25	64.35	63.71	63.42	62.81	63.77	62.93	64.52	65.64	65.38
		c	52.38	60.25	60.85	62.09	62.99	62.72	63.50	62.72	62.67	63.48	62.95	64.49	64.44	63.93
6	xxxxx	ø	51.15	59.46	60.36	62.42	62.88	62.94	62.97	61.89	61.30	62.66	62.73	63.93	64.15	63.14
		a	51.71	61.31	61.71	63.54	63.58	63.91	64.87	63.58	62.69	63.45	64.03	66.20	65.34	65.04
		b	51.22	59.24	60.41	62.97	63.57	63.55	62.69	61.55	61.91	63.18	63.15	63.45	64.68	64.54
		c	50.66	57.94	59.05	60.91	61.44	61.33	61.35	60.58	59.53	61.36	61.12	62.26	62.37	59.40
7	xxxxx	ø	51.43	59.77	60.53	62.88	63.18	63.46	63.61	63.38	62.79	63.40	63.38	65.06	65.01	63.88
		a	52.21	59.86	60.46	63.18	63.03	63.66	64.18	64.14	62.61	62.83	62.57	64.79	65.04	63.26
		b	51.97	60.30	61.40	63.54	64.10	64.01	64.36	64.09	63.79	64.42	65.07	66.10	66.02	66.26
		c	50.25	59.14	59.68	61.98	62.40	62.69	62.29	62.06	62.12	62.96	62.41	64.28	64.12	61.87
8	xxxxx	ø	50.82	58.64	60.20	61.48	62.63	62.81	62.67	61.93	62.35	62.53	62.68	63.64	63.49	63.32
		a	51.67	59.20	61.15	62.02	62.63	63.54	63.40	62.22	62.45	62.11	63.10	63.96	63.78	64.27
		b	50.07	58.48	59.88	61.23	62.35	62.41	62.61	61.93	63.61	62.94	62.39	63.60	63.97	62.87
		c	50.73	58.25	59.64	61.18	62.91	62.48	62.05	61.65	61.10	62.55	62.55	63.33	62.74	62.75

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

Average weight of eggs

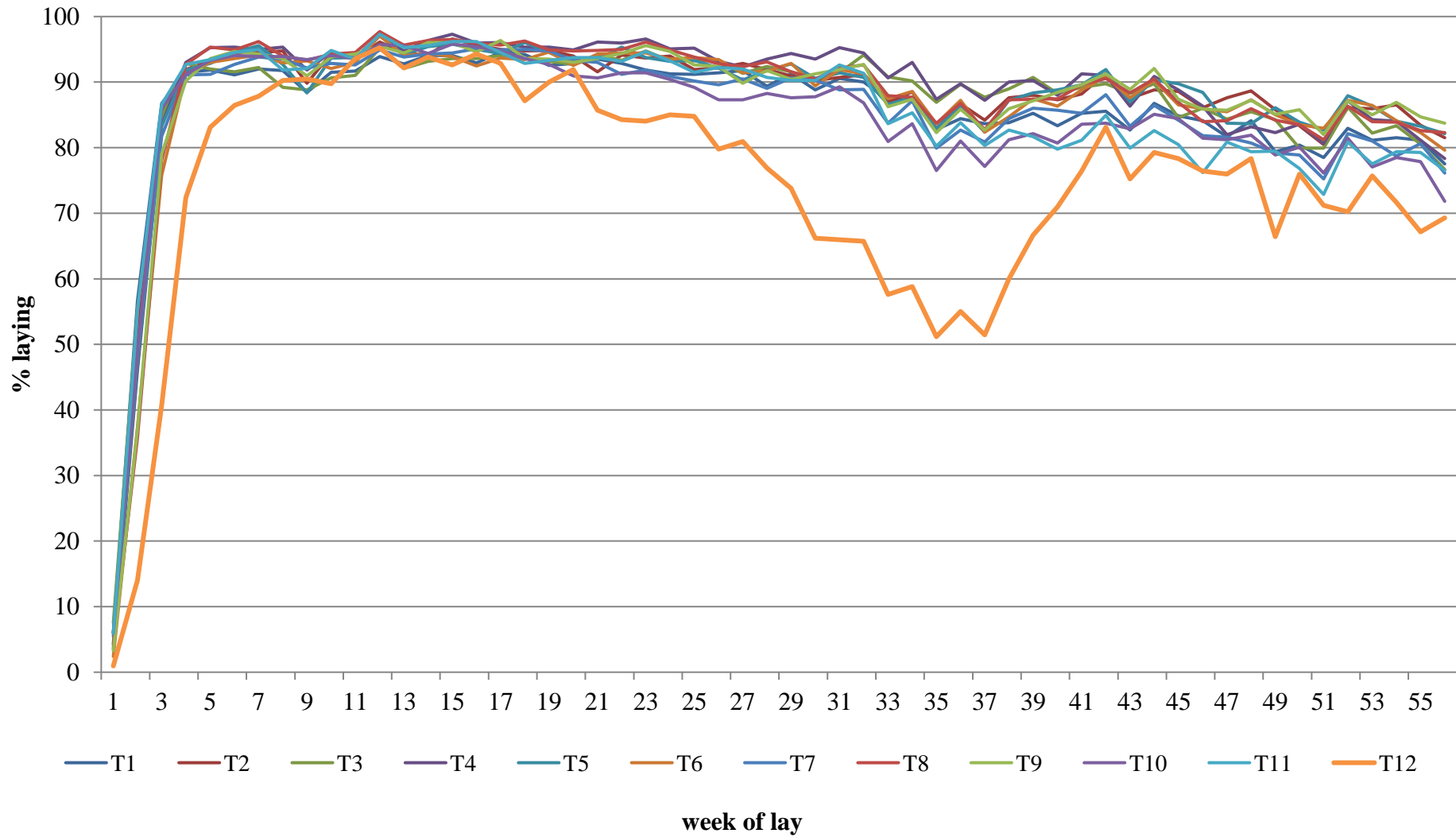
Tab. No. 12 (page 3)

in four weeks long periods (g)

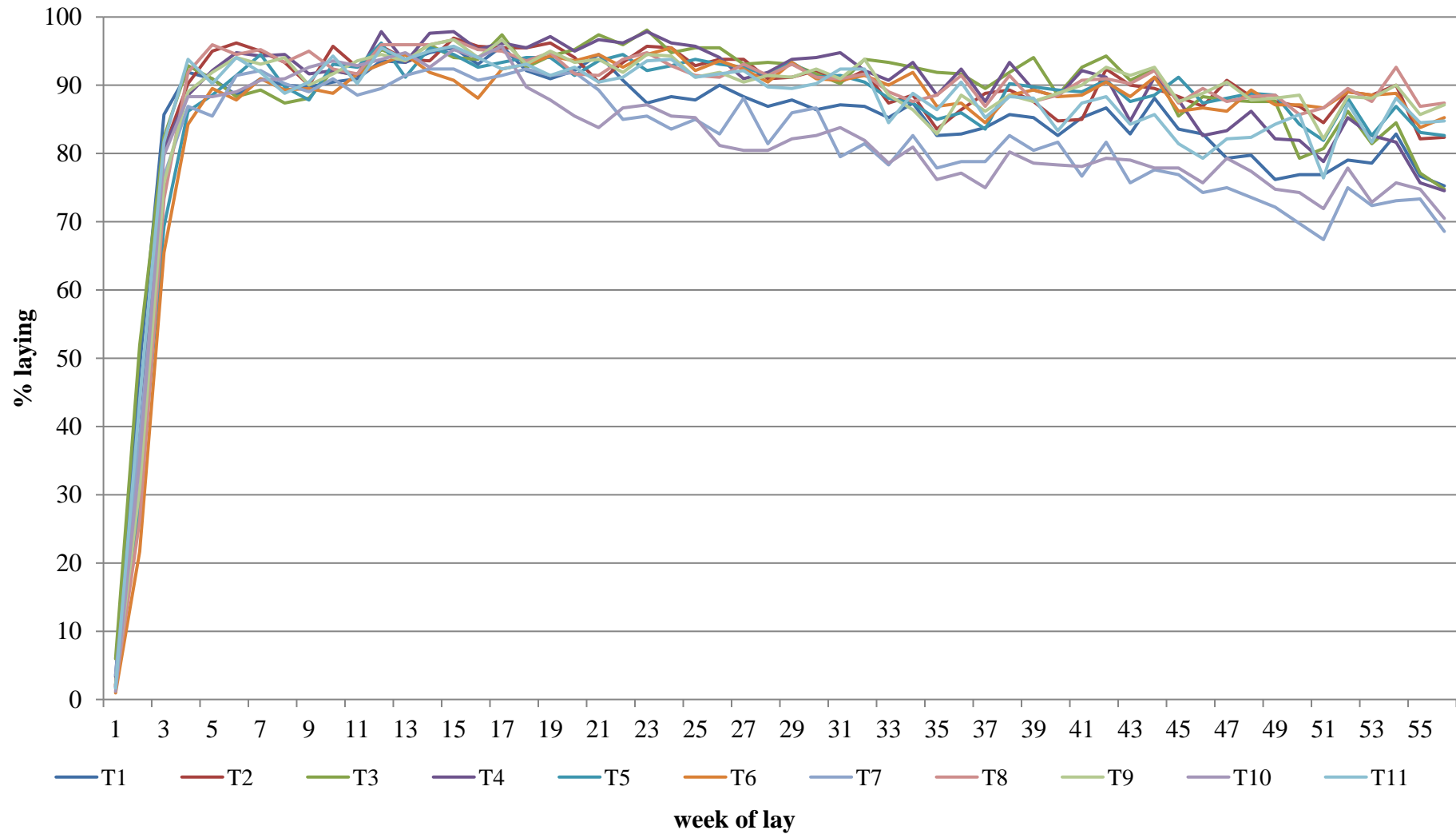
Treatment	Cross		Period													
	Way of rearing		1	2	3	4	5	6	7	8	9	10	11	12	13	14
9	xxxxx	ø	50.40	59.12	60.17	61.30	62.09	62.20	62.17	61.94	60.80	61.88	62.06	63.33	63.24	63.15
		a	50.95	60.00	60.45	61.78	62.03	62.48	62.38	62.20	61.50	62.45	62.33	64.17	63.53	63.30
		b	50.50	58.24	59.56	60.96	61.84	62.16	62.63	61.85	60.57	61.92	62.08	64.07	63.45	63.61
		c	49.80	59.10	60.50	61.18	62.38	61.95	61.54	61.79	60.36	61.28	61.78	61.81	62.75	62.57
10	xxxxx	ø	49.74	58.95	60.19	61.90	62.90	62.74	63.10	62.50	62.41	62.00	63.14	64.32	64.66	63.62
		a	49.58	59.14	60.95	62.17	63.11	62.75	63.28	62.57	62.58	63.16	63.81	64.91	64.80	64.60
		b	49.19	57.88	60.19	62.00	62.47	63.35	63.11	62.80	62.81	60.74	63.06	63.79	64.14	63.33
		c	50.42	59.88	59.43	61.53	63.16	62.09	62.93	62.13	61.92	62.21	62.62	64.38	65.04	63.08
11	xxxxx	ø	49.81	58.62	59.41	61.40	62.00	61.83	62.78	61.56	61.88	62.10	62.03	64.66	63.39	63.13
		a	50.80	59.31	60.58	62.22	62.54	62.24	62.91	61.81	61.93	62.37	61.90	65.04	63.85	63.97
		b	48.87	57.52	59.19	60.90	62.09	61.59	63.22	61.46	62.70	62.33	62.46	65.12	63.31	62.77
		c	49.71	59.07	58.55	61.16	61.45	61.69	62.23	61.41	61.05	61.66	61.75	63.88	63.06	62.59
12	xxxxx	c	48.56	52.68	54.68	57.47	58.75	60.21	60.40	60.80	60.88	61.67	62.08	63.00	63.33	62.64

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

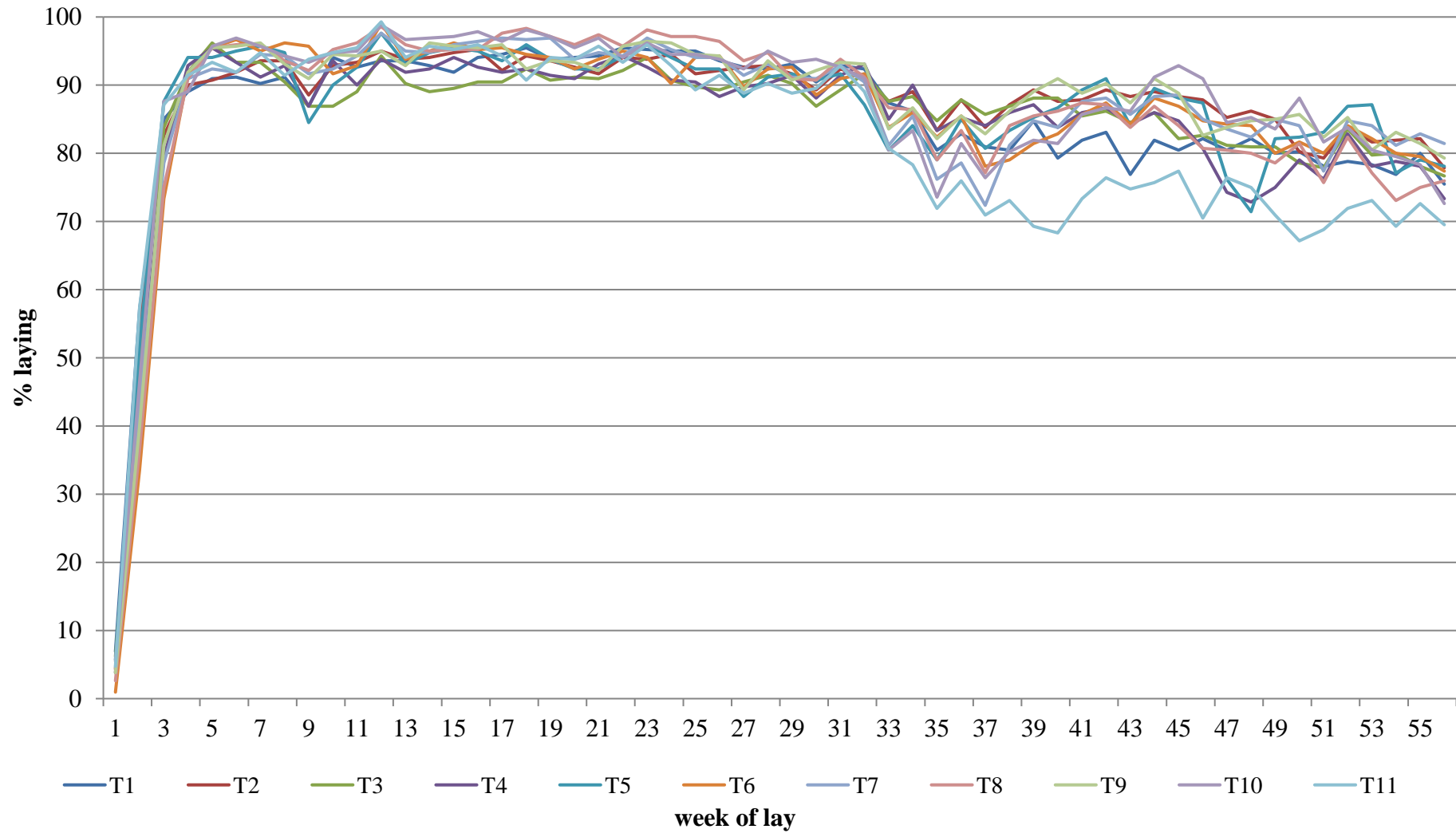
Graph no. 1: intenzity of laying (\emptyset)



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+non beak trimming)



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

