



**MEZINÁRODNÍ TESTOVÁNÍ DRŮBEŽE**  
státní podnik, ÚSTRAŠICE

---

390 02 Tábor 2

Tel.: 381 200 320

**Feeding test of laying hens**

**24/2020**

**- cage system**

**The final report**

**(2020 – 2021)**

Study Investigator: Ing. Jiří Fara  
Ing. Markéta Krekulová

Ústřašice, July 2021

## 1 Objective

The objective of the study was to evaluate the effect of feeding on zootechnical performance and health status of laying hens.

## 2 The basic data of performance test

### 2.1 Performance test

The performance test of final layer's hybrids consists of:

- hen keeping: 32 weeks long laying period (127 – 350 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

2160 eighteenth week old laying hens of genotype [REDACTED] were delivered to the test station.

### 2.4 Test term

Beginning of laying, beginning of the period 1:

28 October 2020

End of laying, end of the period 8:

8 June 2021

## 3 Production period

### 3.1 Treatments

Tr. No.	Description	Replicates	Total hens
1	[REDACTED]	36	1080
2	[REDACTED]	36	1080

Trial was divided into 4 week periods (total 8 periods). Treatments were kept in coincident environment conditions.

### 3.2 Housing system

Hens were kept in windowless house with full climatic control. They were kept in 3-tier cage batteries - enriched cages with 756 cm<sup>2</sup> of floor space per hen. The enriched cages were equipped with a groove feeder, drinkers, a perch, a nest, a roosting ash place and a facility for grinding of talons.

Feed was manually filled in the feeders. Nipple automatic drinkers were used. Belt conveyer for clearance of excrements. Eggs were collected manually, each treatment separately.

### 3.3 Environment conditions

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

### 3.4 Lighting program

Hens were kept in windowless house. Lighting program was controlled according to time setting:

Age	Hours of light	From - to	Luminous intensity (lx)
Week 19	14	5 <sup>00</sup> – 19 <sup>00</sup>	15 - 20
Week 20	15	5 <sup>00</sup> – 20 <sup>00</sup>	15 - 20
Week 21	15.5	5 <sup>00</sup> – 20 <sup>30</sup>	15 - 20
Week 22 – end of the test	16	5 <sup>00</sup> – 21 <sup>00</sup>	15 - 20

### 3.5 Feeding

Layers were fed ad libitum. Feed was produced in [REDACTED]

**Composition of the feed:**

Ingredients (%)							
		N0	N1-Start	N1	N0	N1-Start	N1
Wheat		51.26	35.03	45.82	40.13	54.51	51.13
Maize		15.00	20.60	15.00	10.00	10.00	15.00
Barley		-	-	-	20.00	-	-
Extr. soybean groats		16.35	16.20	11.60	10.00	19.39	8.50
Wheat bran		2.30	-	-	-	2.80	-
Sunflower meal		2.50	7.10	7.30	-	-	8.00
Rapeseed meal		3.00	5.00	5.00	10.00	2.00	3.50
Limestone		3.53	4.62	4.68	2.85	2.95	3.00
Limestone-roughly ground		2.00	4.80	4.80	3.00	5.30	6.00
Soybean oil		0.30	1.46	1.92	2.00	1.55	2.80
Animal fat		1.82	3.48	2.20	-	-	-
MCP - monocalciumphosphate		0.80	0.55	0.47	1.24	0.73	1.10
Sodium sulfate		0.17	0.19	0.17	-	-	-
Salt		0.24	0.24	0.24	0.30	0.37	0.35
DL-methionine		0.15	0.16	0.14	0.18	0.15	0.13
Lysine-HCL		0.13	0.12	0.21	0.06	-	0.20
L-threonine		-	-	-	0.02	-	0.03
Premix		0.45	0.45	0.45	0.22	0.27	0.26
<b>Nutrient content (calculated values)</b>							
Crude protein	g/kg	169.10	173.90	161.00	161.32	172.64	161.35
Fat	g/kg	40.00	68.00	58.80	39.32	33.34	46.69
Crude fiber	g/kg	33.10	40.00	40.00	40.08	31.80	39.46
ME	MJ/kg	11.50	11.45	11.40	11.23	11.61	11.25
Lysine	g/kg	8.26	8.58	7.93	7.54	8.11	7.80
Methionine	g/kg	3.96	4.27	3.91	4.37	4.06	3.91
Methionine + cysteine	g/kg	7.13	7.49	6.99	7.75	7.37	6.97
Threonine	g/kg	5.91	6.30	5.67	5.86	6.01	5.68
Tryptophan	g/kg	2.02	2.06	1.90	1.96	2.21	1.87
Ca	g/kg	23.00	37.00	37.00	25.67	35.10	37.31
P	g/kg	5.90	5.40	5.10	7.00	5.59	6.52
P (digestible)	g/kg	4.40	3.90	3.70	3.72	3.81	4.50
Vitamin A	U.I./kg	10000.00	10000.00	10000.00	9468.49	9470.98	9730.00
Vitamin D3	U.I./kg	3000.00	3000.00	3000.00	1820.00	1819.09	4277.40

## **4 Evaluated parameters**

### **4.1 Feed consumption**

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

### **4.2 Live body weight**

- at the age of 18 week – individual weighing
- at the age of 50 weeks (final weight) – individual weighing

### **4.3 Health and mortality**

- mortality of hens and it's causes

### **4.4 Egg yield and laying intensity**

Egg yield was recorded every day. Eggs were collected manually at the same time every day. Eggs of different treatments were collected separately. Production was evaluated in 8 four weeks long periods, from 127 to 350 days of age.

Results of the egg yield:

- per 1 hen of initial flock
- per 1 hen of average flock
- per 1 hen of initial flock for individual laying periods

### **4.5 Sexual maturity**

- age of the layers at attaining 10 %, 30 %, 50 % and maximum % of laying intensity

### **4.6 Egg weight**

- average egg weight for individual laying periods
- average egg weight for the whole control period
- classes of eggs

### **4.7 Production of egg mass**

- per 1 hen of initial flock
- per 1 hen of average flock

### **4.8 Share of nonstandard eggs**

Nonstandard eggs were excluded by sorting.

- cracked eggs
- broken eggs
- double yolked eggs
- membranes

#### **4.9 Egg quality**

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

### **5 Results**

Tab. No. 1	Results of the egg yield
Tab. No. 2	Feed consumption
Tab. No. 3	Live weight
Tab. No. 4	Mortality and it's causes
Tab. No. 5	Share of nonstandard eggs
Tab. No. 6	Weight classes of eggs
Tab. No. 7	Egg quality
Tab. No. 8	Laying intensity
Tab. No. 9	Average egg weight

Graph No. 1	Laying intensity
-------------	------------------

**Results of the egg yield**

**Tab. No. 1**

Treatment	Tr. No.	Age at the yield					Egg production per				Egg weight	Egg mass per	
		10%	30%	50%	Max.		hen - housed		hen - day			g	hen - housed
					day	%	number	%	number	%	kg		kg
T1	1	142	148	152	166	100.00	193.63	86.44	194.32	86.75	60.36	11.69	11.73
T2	2	143	148	151	166	100.00	192.95	86.14	194.67	86.91	60.39	11.65	11.76

**Feed consumption****Tab. No. 2**

<b>Treatment</b>	<b>Tr. No.</b>	<b>Feed consumption</b>			
		per 1 hen	per 1 egg	per 1 kg of egg mass	per 1 feeding day
		kg	g	kg	g
T1	1	27.37	140.85	2.33	122.19
T2	2	28.21	144.92	2.40	125.94



**Live weight at 18 and final weight****Tab. No. 3**

<b>Treatment</b>	<b>Tr. No.</b>	<b>Live weight (g)</b>	
		18 weeks	Final weight (50 weeks)
T1	1	1525.79	2055.26
T2	2	1543.69	2077.81

**Mortality and it's causes**

**Tab. No. 4**

Treatment	Tr. No.	Number of hens				Causes				
		Initial flock	Final flock	Mortality		6	7	9	11	12
		birds	birds	birds	%					
T1	1	360	347	13	3.61	2	-	3	8	-
T2	2	360	338	22	6.11	1	1	6	13	1

Diagnostic:

6 - Injuries	11 - Metabolic derangement
7 - Digestive tract diseases	12 - Cannibalism
9 - Reproductory tract diseases	

## Share of nonstandard eggs

Tab. No. 5

Treatment	Tr. No.	Eggs laid	Cracked eggs		Broken eggs		Double-yolked eggs		Membranes		Nonstandard together	
		number	number	%	number	%	number	%	number	%	number	%
T1	1	209115	6448	3.08	3700	1.77	1	0.00	1752	0.84	11901	5.69
T2	2	208388	6582	3.16	3625	1.74	0	0.00	1687	0.81	11894	5.71

**Weight classes of eggs****Tab. No. 6**

<b>Treatment</b>	<b>Tr. No.</b>	<b>Average egg weight</b>	<b>XL</b>	<b>L</b>	<b>M</b>	<b>S</b>
			(= > 73 g)	(63 - 73 g)	(53 - 63 g)	(= < 53 g)
		g	%	%	%	%
T1	1	60.36	1.50	30.25	63.60	4.65
T2	2	60.39	1.51	29.30	63.27	5.91

**Egg quality - Period 4**

**Tab. No. 7a**

Treatment	Tr. No.	Egg weight g	Yolk weight g	Shell strength N	Shell thickness mm	Haugh's units	Yolk colour				Egg shell colour			Blood spot sum
							L	a	b	Roche	L	a	b	
T1	1	60.08	15.54	45.95	0.30	84.80	-5.18	4.0	9.5	12.35	53.24	19.8	27.7	1
T2	2	58.94	15.64	44.55	0.29	86.30	-4.56	3.4	9.9	11.66	54.78	19.6	28.0	1

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 6**

**Tab. No. 7b**

Treatment	Tr. No.	Egg weight g	Yolk weight g	Shell strength N	Shell thickness mm	Haugh's units	Yolk colour				Egg shell colour			Blood spot sum
							L	a	b	Roche	L	a	b	
T1	1	61.25	16.39	42.74	0.26	85.07	-5.51	3.9	9.2	12.39	56.77	19.9	29.1	0
T2	2	61.51	16.93	41.97	0.25	84.25	-5.41	3.7	9.2	12.25	57.31	18.7	28.6	2

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 8**

**Tab. No. 7c**

Treatment	Tr. No.	Egg weight g	Yolk weight g	Shell strength N	Shell thickness mm	Haugh's units	Yolk colour				Egg shell colour			Blood spot sum
							L	a	b	Roche	L	a	b	
T1	1	60.65	16.69	38.23	0.26	83.86	-5.52	3.5	9.1	11.96	55.59	20.6	29.1	1
T2	2	60.03	16.82	38.64	0.26	85.98	-4.64	3.4	9.7	11.81	57.05	20.4	29.5	2

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 in four weeks long periods (%)

Tab. No. 8

Treatment	Tr. No.	Period							
		1	2	3	4	5	6	7	8
T1	1	33.90	93.98	94.92	94.39	95.40	93.36	93.60	91.97
T2	2	33.31	95.06	94.63	94.00	94.32	92.62	93.16	92.02



Average egg weight in four weeks long periods (g)

Tab. No. 9

Treatment	Tr. No.	Period							
		1	2	3	4	5	6	7	8
T1	1	49.47	57.21	59.71	61.33	62.10	63.04	61.27	61.84
T2	2	49.70	57.11	59.82	61.00	61.98	63.08	61.80	61.83

Graph no. 1: Intenzity of laying

