MINISTRY OF EDUCATION, RESEARCH AND INNOVATION

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Report on the research activities accomplished during 2010, in the project entitled:

"RESEARCHES RELATED TO THE PHYSIOLOGICAL AND CIRCADIAN SECRETOR INVOLVEMENTS OF THE PINEAL GLAND IN THE REPRODUCTION STATUS OF THE LAYING HENS "

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PROJECT MANAGER:

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The experimental protocol provided for the year 2010 comprised objectives and activities aimed at specifying the pineal gland secretory function in adult laying hybrids.

The research was conducted on 4 laying hybrids: Albo-SL, Ross, Hisex Brown, Lohmann Brown, assigned to experimental groups, differentiated by lighting regime to which the birds were subjected. Birds were monitored during the laying, realizing determinations of metabolic profile in order to clarify reproductive status, assessing the technological parameters of the growth areas, to characterize the relationship between exposure to light and the functioning of hypothalamic-pituitary-gonadal-pineal birds axis; achieving histological interpretation was a safety feature in assessing the fairness of physiological interpretations.

Pineal gland secretory function specification is based on interpretation of circadian and seasonal metabolic rhythm and melatonin and enzymes involved in its synthesis follows a similar rhythm with rhythmic variations caused by photoperiod lengths.

Epiphyseal photosensitivity is mainly due to inheritance of serotonin and melatonin secretion, while nocturnal secretion of melatonin in birds is involved in reducing feed consumption, feed conversion. Light modulation schemes for laying birds must meet specific physiological age and productive specialization. Analysis and characterization of haematologic and biochemical blood profile for the interpretation of reproductive status in laying hens is a way of reasoning approach lighting schemes in the expression of the productive potential response..

Light exercises in most birds a stimulating action to the reproductive function and to achieve the annual reproductive cycle. Light works by day length response, animals synchronize together by alternating day and night (circadian rhythms).

To follow the interpretation of parameter values it was necessary to specify the physiological context in which reproductive function is found in chickens. Thus, light acts onto the fowl at two levels:

- the retina, through orange and red radiation (620-750 nm) with a neuro-vegetative function, different by the visual function;
- in depth, by trans-skull penetration or by transorbitar way, light radiation acts on the hypothalamus and pineal gland (especially orange red radiation with a wavelength of 640 nm).

Unlike mammals, the ability of transcranial transmission of light radiation explains that the eye is not indispensable to achieve photo-sexual reflex in many species of birds, especially in chickens.

Photo-sexual reflex is a neuro-light kind and consists of a sequence of neurosecretions and release of hormones that reach the ovaries via the general circulation. Stimuli issue from the retina or intracranial receptors and act on specific nuclei of the hypothalamus, which secrete and release the hypothalamic portal system - gonadoliberinele pituitary FSH - and LH RF - RF before reaching the anterior pituitary. Thus, the portal circulation ensures the humoral hypothalamic control of hormonal secretion of adenopituitary FSH and LH, which acts on the ovary.

The influence of external conditions is a complex of physical, chemical, biological, anthropogenic, feeding factors directly or indirectly affecting the reproductive potential of birds. The intensity and duration of the environmental factors action have certain limits of tolerance, existsing for a particular species of bird an optimal level for growth, sexual maturity and occurrence of its reproductive potential.

Ambient temperature has a minimum and maximum limit between birds lead an active life and an optimum temperature, which depends on the intensity of metabolism, physiological state and stage of development.

In the reproductive activity of birds seems that the temperature has a significant effect on age of onset of the first egg, so the sexual development. Temperatures that are outside the specific tolerance, delay the occurrence of sexual maturity.

Nutrition has bodies and provide increased role in the induction of gonadal activity.Food acts as a limiting factor, both in quantity and the quality of them (the contents of protein substances, carbohydrates, lipids, essential amino acids, vitamins and minerals). The balance quantity and quality of food provides the nutrients for vital functions, growth and reproductive activity of birds.

In terms of microclimate factors, the technology modulation is very important in the expression of genetic potential productive.

Our studies have focused mostly on the length of photoperiod, which is the main environmental factor that modulates the activity of reproduction. He highlighted the close link between length of day and sexual maturity, thus gradually increasing photoperiod during growth causes early sexual maturity, while a slow decrease in photoperiod. Onset of sexual maturity in chickens is therefore subject to a complex of external stimuli on the retina or directly acting on the nervous and endocrine system.

Avian physiology research that indicated the role of physiological factors involved in reproductive activity of birds is highlighted by underlining the differences in appearance and reproductive development in birds, which apparently are maintained under identical conditions.

Reproductive activity is determined by the arrival of "gonadostat" hypothalamic-pituitary. Sexual maturity is the physiological state characterized by an increase in ovary and oviduct weight and maximum reproductive functional expression. Ovarian estrogen growth occurs as a result of maturation of ovarian follicles under the influence anterohipofizare gonadotropin (FSH, LH), in turn, is under hypothalamic control.Although hypothalamic center that controls gonadotropin release is not well defined, it seems that the region preoptică tubero-infundibular tract and have an important role in this direction. Also, the median eminence by neurohormonal secretions causes ovulation in birds.

Study of laying hybrids aged between 20 and 80 weeks of work involved monitoring morphophysiological totality, metabolic and behavioral sexual maturity occurring in characterizing the reproductive work done during the year and define the reproductive cycle.

Laying cycle (laying period) is a component of the reproductive cycle, followed in succession in natural conditions during the incubation and care of chickens.

In the classic nictemere 24 hours a day length response 16 hours a day unfractionated (16L/8D) from 5 am until 21 pm tonight, the chicken make an egg every day for 3, 4, 5 days more after the break following a day (sometimes more).

During laying, ovulation and laying cycles are carried out under the influence of complex rhythmic hypothalamic-pituitary-gonadal and other hormonal factors, including epiphyseal, modulated by variations in environmental technology (photic, thermal).

Within the ovarian follicle growth and maturation occurs after a certain hierarchy, under the action of FSH. 4-5 days before ovulation, follicles increase their capacity for synthesis of steroid hormones (estrogen and testosterone). Mature follicle (F1) secrete progesterone in response to a small amount of LH is sufficient to produce the appearance of the peak of LH that induces ovulation preovulator. Maturing follicles coincides with the change of enzymatic machinery necessary for synthesis of different steroids. In about 16 hours before ovulation, under normal day-night alternation, previous pituitary LH release first small amount, usually at the beginning of the dark. In mature ovarian follicle, is at 12-14 hours before ovulation and the release of progesterone secretion, which acts through positive feedback on the hypothalamus.The hypothalamus is sensitive to this stimulus and responds by developing enclosed area hypophisotrope with LH-RF, which causes ovulation to 6-8 hours before the second release of LH that induces ovulation (preovulatory period, sensitivity to LH peakconcentration of FSH is low). Hypothalamic LH-RF release in response to progesterone action, requires a minimum level of circulating Ca2+. This explains stopping ovulation within a few days without calcium in feed.

Age corresponding period of the laying cycle, which includes different stages in the sequential changes of Morphology and Functional and metabolic adaptations characteristic.

In the first period and physiological changes occur morphostructural of the whole body:

- increase the weight of ovary and oviduct;
- serum calcium level rises sharply 2.5-3 times (about 250 mg / l) compared with the latency period (about 110 mg / l), initially through intensive use of reserve calcium from your skeleton (bone marrow substance) after gradually increasing absorption of calcium from food;

- protein metabolism and significantly increase overall system I needed about the intense training in yolk, egg white and shell biosynthesis;

- fosforemia reach 200% and alkaline phosphatase activity is increasing;

- increases lipemia to 300-350%, especially phospholipids.

The main stage of laying the remains 9-10 months, the mechanisms that control the rhythm make an ovulatory ovarian function, determines the number of eggs, duration (length) sequences of laying and total egg production in hens studied. During this period there is a precise functional coordination between the ovary and oviduct, as well as with other organs and tissues to ensure training needs calcium for eggshell. During the actual laying of calcium daily turnover is about 10% of the amount of calcium in the body. Lack of calcium during this period leads to the formation of soft shelled eggs, or even stop laying. Increases the total amount of phosphorus in the blood serum of 4-5 times, compared to the rest, especially in the form of phospholipids, phosphoproteins and inorganic phosphorus.

In the egg laying period reached about 23 g, our research showed that there is a positive correlation between serum calcium, fosforemie, and fosfoproteinele of blood serum phospholipids.

Complexity ovarian interrelationships with other organs and tissues, and metabolic adjustments hens lay during neurohormonal are strictly controlled.

Period end of the laying period is relatively short, is characterized by physiological laying off under the action of antigonadalã prolactin, which generally induce hatching behavior. During this period the ovary and oviduct function is impaired, the amount of FSH and LH vary inversely with the amount of prolactin. Stop laying occurs due to insufficient essential substances involved in egg formation and reducing the reserve substances in the body, eg. serum calcium is involved in regulation of ovarian function. At the end of egg laying can occur without the yolk and the body has the following changes morphophysiological changes:

- total body weight decreased by 20-25%, especially adipose tissue and bone;
- ovary and oviduct weight decreases by 75% and 60%;
- reduced liver weight by 50%;
- lowers serum calcium and lipemia;
- refill the cavity with bone marrow.

Activities in the reporting year represents a significant volume of data through which the opportunity of completing the picture of the implications of the physiological and circadian secretion of pineal gland in the reproductive status of laying hens.

The first objective was to obtain values of hematological and biochemical blood parameters to characterize the relationship between metabolism and secretory functions of the pineal gland in adult birds.

The experimental protocol was performed by using established techniques accepted in physiological research for all types of tests performed (hematology determinations, biochemical, histological, recording microclimate factors, mass determinations, etc..).

To achieve the objectives and associated activities have been three experimental groups, each consisting of 108 birds belonging hybrids Albo-SL, Ross, Hisex Brown, Lohmann Brown kept the floor, with a density of 5 hens per square meter. Each experimental group was subjected to different photoperiod, as follows: L1 - 24L, L2 - 12L/12D; L3 - 16L/8D. To confirm the different physiological activities for each experimental group, birds were slaughtered to achieve histological preparations, able to complete the interpretation of the objectives of the study panel. Generally affected by the experimental protocol parameters were: hematological, biochemical, histological studies, light fixtures, light intensity, temperature, humidity, dust and contaminants present, the ventilation system.

Blood values determined at the average of the experimental birds are presented in Tables 1-3.

Table 1

Mean haematological values in L1

Age (weeks)	RBC ($x10^6$µl)	PCV (%)	MCV (µm^3)	MCH (pg)	MCHC (g/dL)	WBC ($x10^4$ µl)
25	3.2	32.4	137.8	47.0	36.2	2.9
35	3.4	38.2	139.6	46.5	37.9	2.8
45	2.8	30.2	140.5	44.9	34.7	2.4
50	3.5	33.9	133.1	49.2	35.1	2.6

RBC – red blood cells count
PCV – hematocrit;
MCV – mean red blood cells volume
MCH – mean blood cells haemoglobin quantity
MCHC – concentration of mean blood cells haemoglobin quantity
WBC – red blood cells count

The analysis of haematological parameters studied reflects the status of birds aged 25, 35, 45, 50 weeks. We found that exposure to continuous lighting regimen of 24 hours without the existence of a "bit" of darkness made functional pinealectomie birds maintained in this system. Birds in group 2 were subjected to experimental regime considered 12L/12D nictemerului normal length. Presenting haematological values mean this group are found in Table 2.

Tabel 2

Mean haematological values in L2

Age (weeks)	RBC ($x10^6$µl)	PCV (%)	MCV (µm^3)	MCH (pg)	MCHC (g/dL)	WBC ($x10^4$ µl)
25	2.6	29.3	132.2	31.0	21.4	1.2
35	2.8	28.6	131.6	40.3	23.6	1.8
45	3.3	30.4	120.2	33.2	33. 0	2.0
50	2.4	31.2	113.1	41.1	45.2	1.4

RBC – red blood cells count
PCV – hematocrit;
MCV – mean red blood cells volume
MCH – mean blood cells haemoglobin quantity
MCHC – concentration of mean blood cells haemoglobin quantity
WBC – red blood cells count

16L/8D lighting regime was addressed in the experimental group L3 and the average values of haematological parameters are found in Table No. 3.

Tabel 3

Mean haematological values in L3

Age (weeks)	RBC ($x10^6$µl)	PCV (%)	MCV (µm^3)	MCH (pg)	MCHC (g/dL)	WBC ($x10^4$ µl)
25	2.2	22.3	127.2	37.3	26.3	2.2
35	2.4	28.6	136.4	36.9	27.9	1.8
45	2.3	22.8	140.5	34.6	30.3	2. 2
50	2.6	33.9	133.3	39.2	35.0	2.4

RBC – red blood cells count
PCV – hematocrit;
MCV – mean red blood cells volume
MCH – mean blood cells haemoglobin quantity
MCHC – concentration of mean blood cells haemoglobin quantity
WBC – red blood cells count

For the interpretation of the birds studied metabolic profile was necessary in addition to achieve haematological profile of blood biochemistry for the three lighting regimes that have characterized the three experimental groups. In Tables 4, 5 and 6 are average values of biochemical parameters studied hybrids.

Table 4

Mean biochemical values for L1

Age (weeks)	Pt (g/dL)	Chol (mg/dL)	Ca (mg/dL)	P (mg/dL)	ALP U/L	AST U/L	UA U/L
25	4.8	235.8	11.4	5.3	102	218	10.5
35	4.5	249.9	10.6	4.5	106	314	9.4
45	3.9	264.8	12.0	4.9	98	228	8.7
50	4.4	296.4	9.2	5.1	104	293	11.3

Pt- whole proteins;
Chol-Cholesterol;
Ca-Calcium;
P-Phosphorus;
ALP-Alanin aminotransferase;
AST-Aspartat aminotransferase;
UA- Uric acid

Table 5

Mean biochemical values for L2

Age (weeks)	Pt (g/dL)	Chol (mg/dL)	Ca (mg/dL)	P (mg/dL)	ALP U/L	AST U/L	UA U/L
25	3. 7	135. 2	8.2	4.4	67	128	6.7
35	2.8	243.1	8.5	4.1	80	147	5.8
45	2.2	221.3	10.2	4.4	96	323	6.9
50	3.3	236.1	10.5	4.8	92	166	7.6

Pt- whole proteins;
Chol-Cholesterol;
Ca-Calcium;
P-Phosphorus;
ALP-Alanin aminotransferase;
AST-Aspartat aminotransferase;
UA- Uric acid

Table 6

Mean biochemical values for L3

Age (weeks)	Pt (g/dL)	Chol (mg/dL)	Ca (mg/dL)	P (mg/dL)	ALP U/L	AST U/L	UA U/L
25	2.3	132.5	9.1	4.9	44	110	5.5
35	2.1	143.3	9.8	4.6	60	174	5.1
45	2.6	164.6	9.3	6.6	96	221	5.6
50	2.4	296.4	9.7	4.3	104	263	7.1

Pt- whole proteins;
Chol-Cholesterol;
Ca-Calcium;
P-Phosphorus;
ALP-Alanin aminotransferase;
AST-Aspartat aminotransferase;
UA- Uric acid

Experimental factor that was custom length experimental period, as was mentioned above.

Hematological and biochemical parameters analysis stresses caused by differences in light regimes used, which implicitly confirms pineal different secretory activity, the length of photoperiod. Hematologic and biochemical values are within normal limits environments without changes induced by formation of the egg stage. With proper diet, as a result of bone reabsorption and intestinal absorption, blood levels of calcium were not changed significantly. Phosphorus level is changed during egg formation, as a result of bone growth, which increases significantly at 10-12 hours post-lay due to the process of mineralization of eggshell. Metabolism of birds kept in continuous photostimulation reflects an acceleration of metabolic processes, values and behavior associated with more active than the other two experimental groups. Implementation and interpretation of histological preparations were necessary to characterize the secretory activity of the pineal gland, activity modulated by photoperiod length.

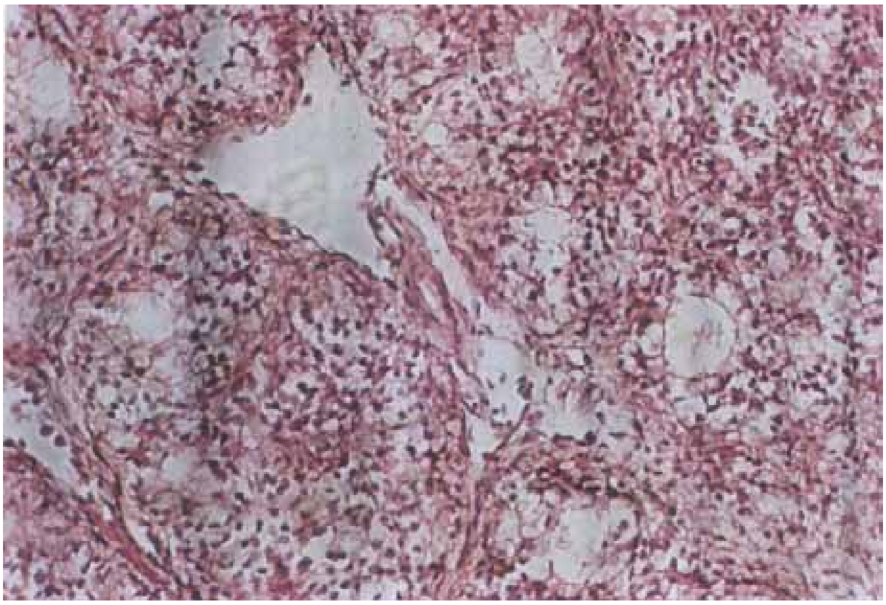

Fig.1- Atrophic pineal, presenting many cystic cavities

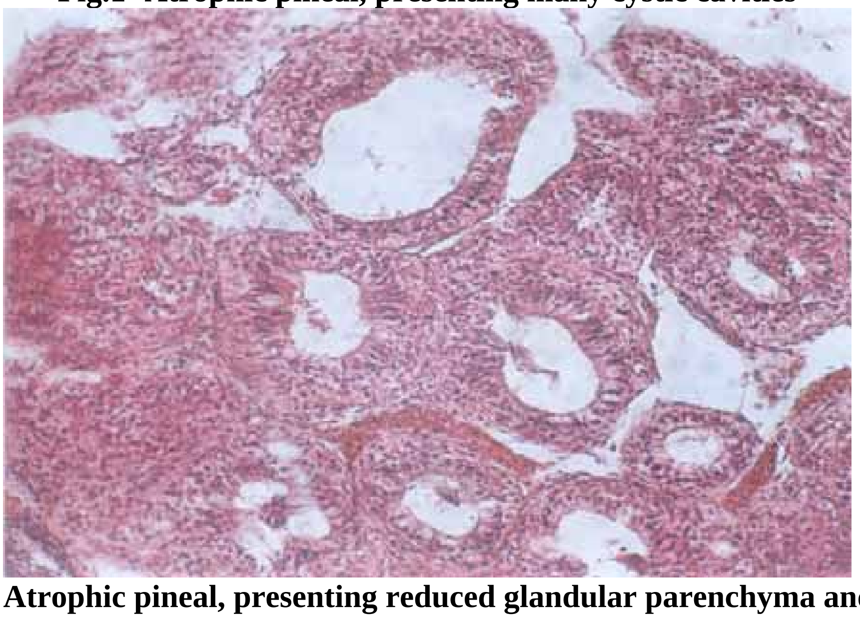

Fig. 2 – Atrophic pineal, presenting reduced glandular parenchyma and many cystic cavities, edged by ependimary ciliated cells

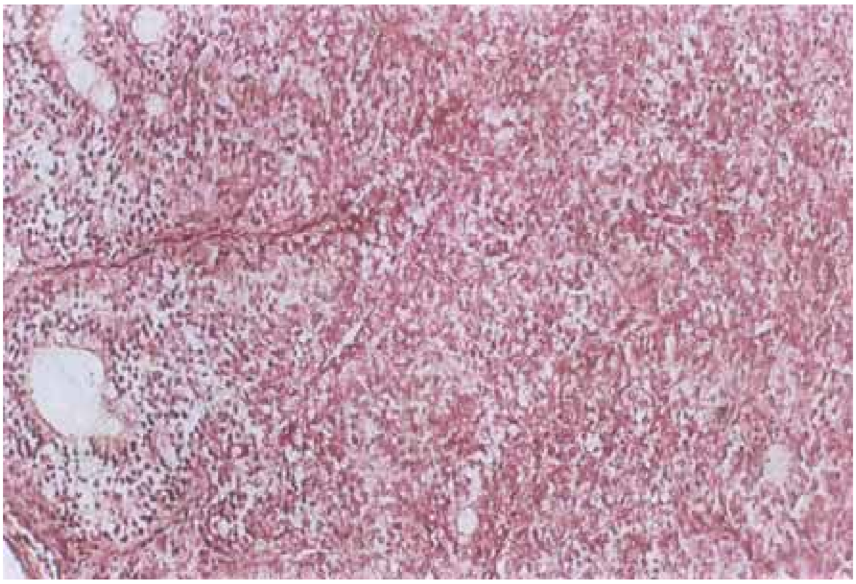

Fig.3 – Normally developed pineal, presenting normal secretory cells

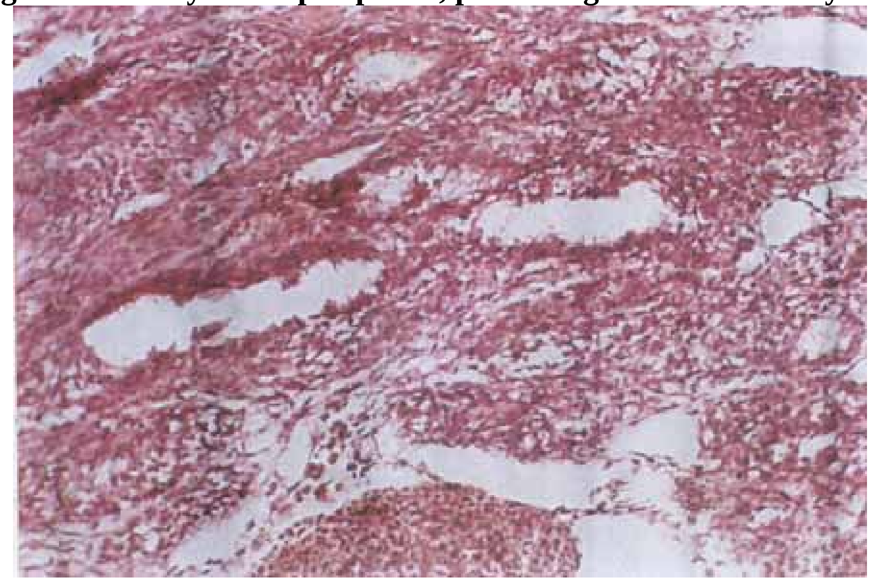

Fig.4 – Pineal gland with pronounced atrophy, many cystic cavities and predominance of clear cells

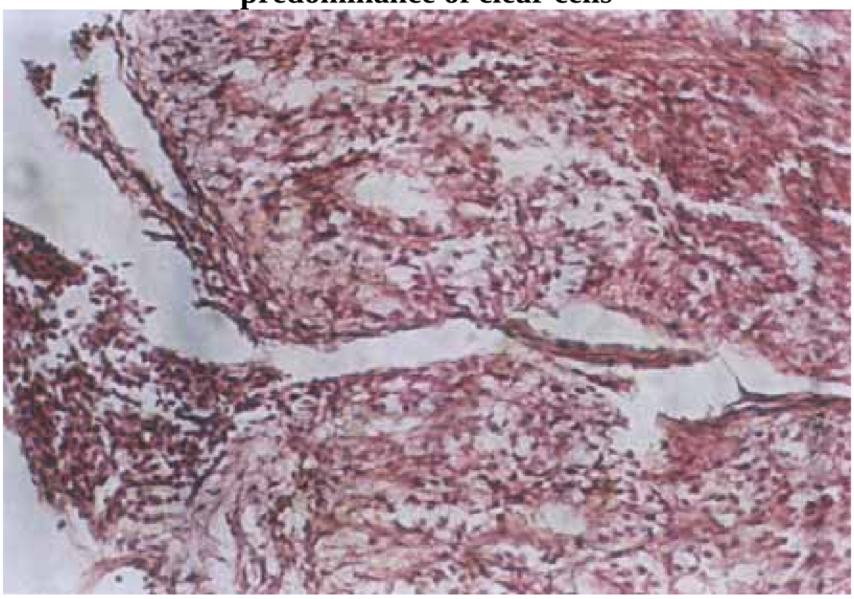

Fig.5 – Normal pineal gland with subcapsular invaginations, areas of dark cells and many clear cells

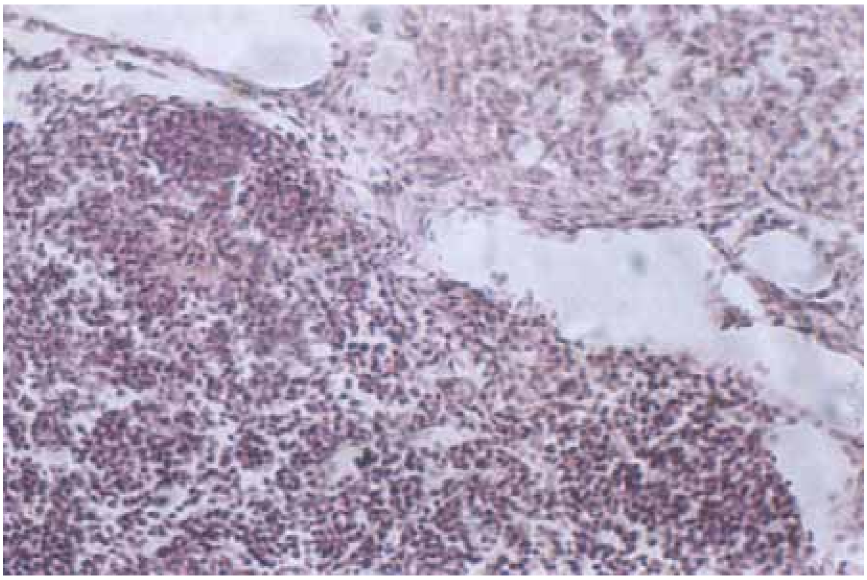

Fig. 6 – Normal pineal gland, presenting many dark cells and less clear cells

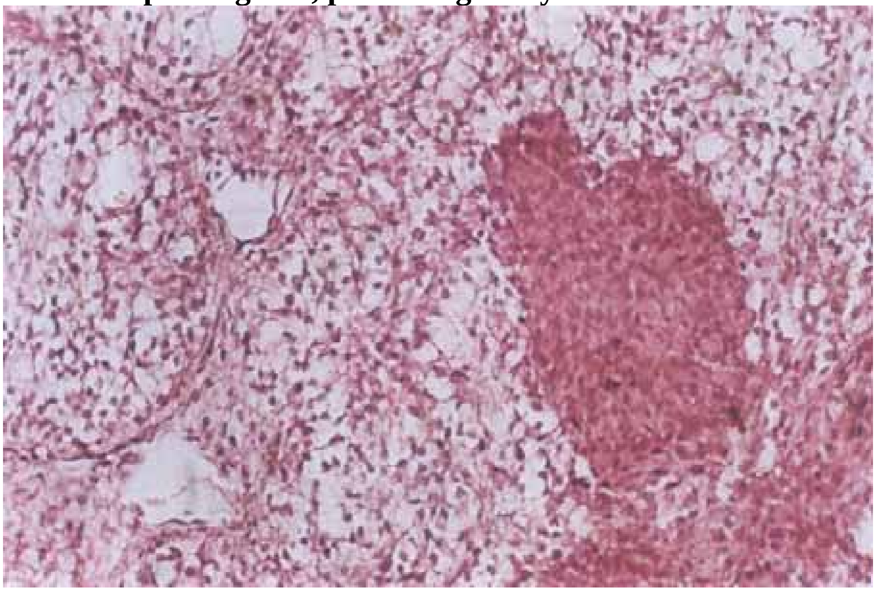

Fig. 7 – Normally developed pineal gland, presenting compact groups of darken cells, alternated with clear cells and rare cystic formations

Epiphysis histological studies performed on birds under the influence of different photoperiod, reflected secretory activity of pineal secretory functions amended and confirmed. Atrophic epiphysis (Fig. 1, 2, 4) is associated with continuous lighting regime, reflecting the suppression of pineal secretory activity by the continuous photoperiod. Images 3, 5 and 6 are assigned to pinealei secretory activity in birds maintained in the 12L/12D photoperiod and photoperiod 16L/8D corresponds to image No. 7.

Development of ovarian follicles and reproductive segments are characteristic birds of the birds studied reproductive activity. Histological preparations of the reproductive segment reflects the productive activity that characterizes the birds in the laying cycle (Fig. 8 ÷ 12).

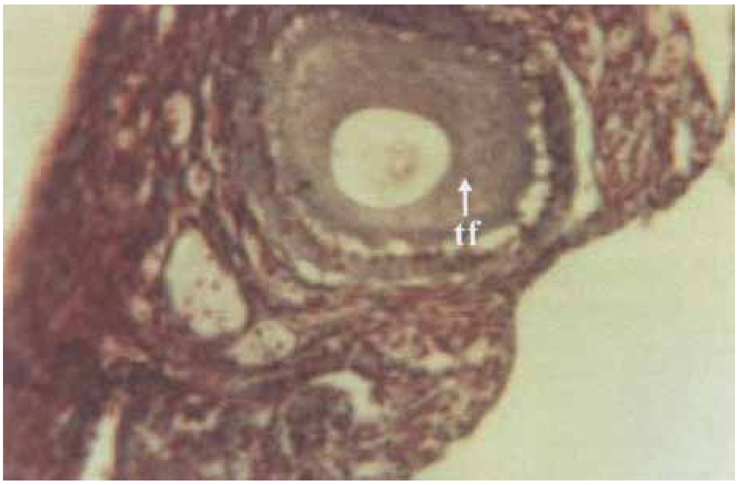

Fig.8- Ovary in laying hens aged 45 weeks, staining Papanicolau x200
tf-tertiary follicle

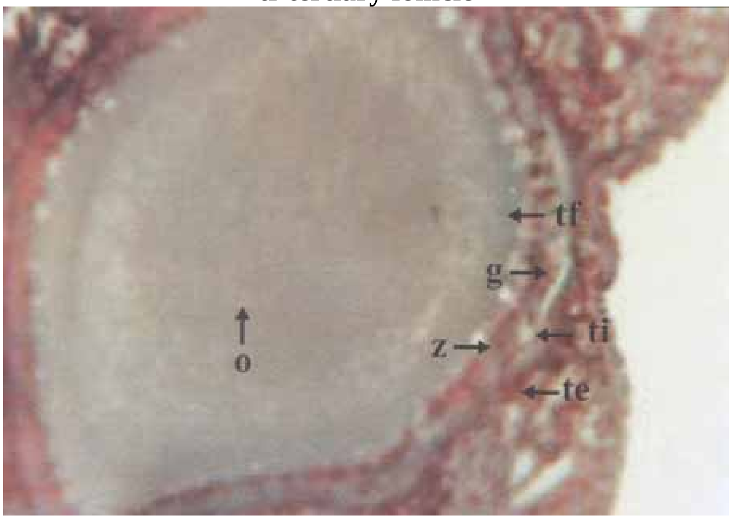

Fig.9- Ovary in laying hens aged 45 weeks, staining Papanicolau x200
tf-tertiary follicle; g-follicle epithelium; z-area radiate, poorly developed and viteline membrane, o-ovule, te- external sheath, ti- internal sheath.

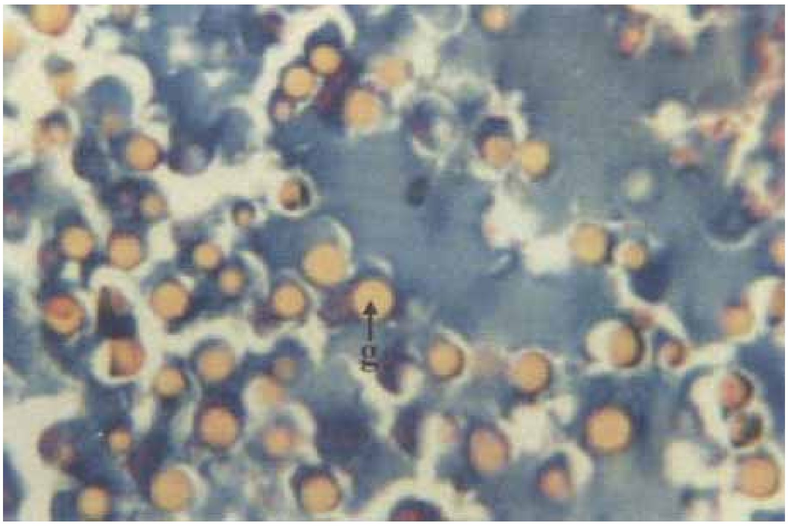

Fig. 10- Ovulator follicle in hen ovary, Staining: Papanicolau x200
g- yolk

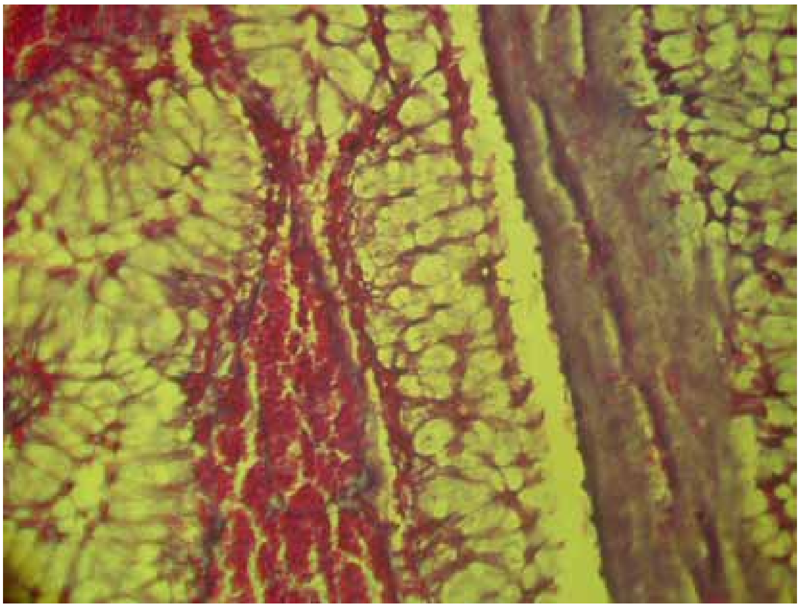

Fig. 11 - Magnum. Hen oviduct. Abundant secretion in lumen. Fowl age-50 weeks. Staining: Novelli; x 400

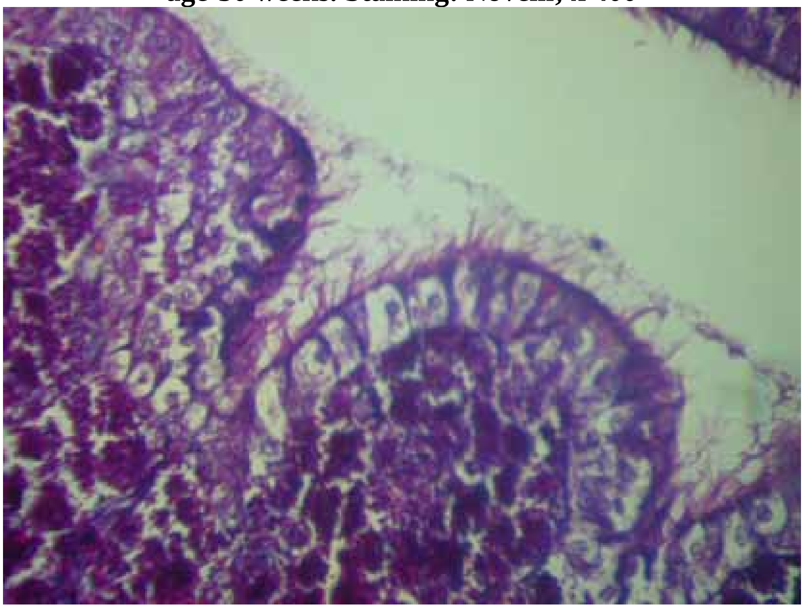

Fig.12 - Isthmus. Hen oviduct. Occurrence of ciliate and goblet cells in the epithelium and of the glands in lamina propria. Fowl age-50 weeks. Staining: PAS; x400

Monitoring of microclimate factors mean temperature values followed during growth, values were recorded in hybrid technology to exploit the provisions of guidelines. Represented photoperiod light-dark alternation, achieving continuous light at group No. 1 (24L), 12L/12D the lot. 16L/8D the experimental group 2 and No. 3. Light intensity was 150 lux, evenly distributed on the surface of growth halls.

Experimental plots were established in 108 laying hens for each hybrid analysis. Ensured density was 5 hens per square meter, the growth conditions on the ground.

Table 7

Temperature dynamics in fowl pens

Age (weeks)	Hall no. 1 (L1) Hybrid Rosso Hybrid Albo-SL Hybrid Lohmann Brown Hybrid Hisex Brown		Hall no. 2 (L2) Hybrid Rosso Hybrid Albo-SL Hybrid Lohmann Brown Hybrid Hisex Brown		Hall no.3 (L3) Hybrid Rosso Hybrid Albo-SL Hybrid Lohmann Brown Hybrid Hisex Brown	
	$\overline{X} \pm s_{\overline{X}}$ (°C)	V%	$\overline{X} \pm s_{\overline{X}}$ (°C)	V%	$\overline{X} \pm s_{\overline{X}}$ (°C)	V%
20	20.68±1.10	14.07	20.61±1.14	14.58	18.01±0.88	12.90
21	20.26±1.10	14.38	20.23±1.17	15.31	18.97±0.90	12.61
22	19.74±1.11	14.88	19.74±1.21	16.17	19.70±0.95	12.79
23	19.15±1.14	15.74	19.30±1.24	16.98	20.03±1.08	14.24
24	18.80±1.14	15.96	19.00±1.23	17.11	20.75±1.12	14.31
25	18.50±1.17	16.72	18.58±1.23	17.54	21.31±1.18	14.66
26	18.39±1.18	16.89	18.47±1.26	17.98	22.48±1.25	14.68
27	18.31±1.18	17.07	18.40±1.27	18.18	23.11±1.29	14.71
28	18.27±1.20	17.38	18.36±1.28	18.44	23.49±1.32	14.80
29	18.22±1.23	17.77	18.31±1.32	18.69	24.25±1.34	14.87
30	18.06±1.24	18.11	18.26±1.33	19.30	22.50±1.28	14.99
31	17.81±1.24	18.44	17.90±1.39	19.41	22.07±1.26	15.12
32	17.52±1.24	18.69	17.61±1.41	19.97	21.45±1.24	15.26
33	17.41±1.27	19.21	17.48±1.41	20.21	21.04±1.23	15.49
34	17.13±1.26	19.48	17.23±1.42	20.52	20.51±1.22	15.75
35	16.95±1.26	19.64	17.01±1.44	21.17	19.37±1.17	15.81
36	16.60±1.26	20.02	16.71±1.46	21.88	19.21±1.15	15.85
37	16.51±1.29	20.69	16.60±1.51	22.64	19.13±1.15	15.86
38	16.45±1.35	21.74	16.55±1.57	23.58	18.89±1.14	15.88
39	16.43±1.41	22.61	16.50±1.63	24.61	18.72±1.13	15.90
40	16.40±1.46	23.48	16.47±1.66	25.08	18.55±1.12	15.94
41	16.36±1.50	24.21	16.44±1.71	25.97	18.40±1.12	16.02
42	16.39±1.55	24.97	16.48±1.73	26.15	18.36±1.13	16.27
43	16.41±1.56	25.13	16.51±1.75	26.44	18.22±1.17	16.91
44	16.62±1.59	25.26	16.63±1.80	26.98	17.98±1.21	17.77
45	16.70±1.59	25.20	16.74±1.79	26.61	18.01±0.88	12.90
46	16.85±1.54	24.09	17.86±1.72	25.38	18.97±0.90	12.61
47	16.97±1.44	22.44	17.99±1.65	24.24	19.70±0.95	12.79
48	17.01±1.36	21.19	18.06±1.51	22.15	20.03±1.08	14.24
49	17.09±1.20	18.54	18.10±1.34	19.61	20.75±1.12	14.31
50	17.18±1.14	17.61	18.31±1.28	18.45	21.31±1.18	14.66
51	17.24±1.05	16.07	18.44±1.26	18.09	22.48±1.25	14.68
52	17.39±1.02	15.41	18.62±1.25	17.68	23.11±1.29	14.71
53	17.47±0.96	14.58	18.80±1.15	16.20	23.49±1.32	14.80
54	17.63±0.88	13.20	18.98±1.15	16.08	24.25±1.34	14.87
55	17.88±0.88	13.06	19.09±1.11	15.41	22.50±1.28	14.99

There have been recordings of microclimate parameters, relative humidity, concentration of ammonia, carbon dioxide and hydrogen sulfide (Table 8).

Table 8

Microclimate parameters in the fowl pens

Monitored parameters	L1 (24L)	L2 (12L/12D)	L3 (16L/8D)
Relative moisture (%)	76.14-84.01	75.32-83.21	76.28-81.9
NH_3 concentration (%)	0.0117	0.0115	0.0116
CO_2 concentration (%)	0.327	0.325	0.0326
H_2S concentration (%)	0.043	0.041	0.0042

All birds were provided a diet of 2750 kcal / kg nc 14.5% P.B. to ensure the 1654-2064 g body weight dynamics considered optimal for egg production (values provided in the guide technological growth). Body weight was in the guide technology growth and does not reflect differences among the groups studied (Table 9).

Table 9

Body weight dynamics, as related to fowl age

Fowl age (weeks)	L1 (24L)		L2 (12L/12D)		L3 (16L/8D)	
	$\bar{X} \pm s_{\bar{x}}$ (g)	V%	$\bar{X} \pm s_{\bar{x}}$ (g)	V%	$\bar{X} \pm s_{\bar{x}}$ (g)	V%
20	1655.11±16.07	9.71	1656.17±26.46	15.98	1654.82±24.93	12.77
22	1782.24±17.61	9.88	1754.58±28.37	16.17	1762.57±30.08	12.84
24	1799.76±17.82	9.90	1829.13±31.20	17.06	1872.39±33.55	13.48
26	1859.31±18.54	9.97	1864.42±32.33	17.34	1885.81±37.28	14.01
28	1882.44±19.05	10.12	1899.53±32.35	17.03	1911.69±40.86	14.75
30	1915.21±19.59	10.23	1900.79±33.53	17.64	1928.44±41.72	15.90
32	1922.12±19.97	10.39	1905.69±33.52	17.59	1937.89±41.65	16.04
34	1931.11±20.24	10.48	1924.71±33.53	17.42	1949.38±43.74	16.26
36	1936.37±20.84	10.76	1948.33±36.99	18.99	1953.25±42.07	16.35
38	1942.45±21.15	10.89	1957.37±36.68	18.74	1955.48±46.01	16.40
40	1958.18±21.83	11.15	1962.12±36.46	18.58	1963.33±45.79	16.53
42	1963.53±22.17	11.29	1979.11±36.93	18.66	1972.33±45.48	16.86
44	1972.88±22.77	11.54	1980.66±37.14	18.75	1979.40±46.33	18.22
46	1984.07±23.37	11.78	1983.75±37.18	18.74	1982.02±45.99	20.11
48	1985.64±23.93	12.05	1987.27±39.51	19.88	1984.38±45.66	21.02
50	1989.61±24.65	12.39	1991.30±43.43	21.81	1987.41±48.21	21.46
52	1992.38±25.06	12.58	1995.41±43.84	21.97	1989.86±49.79	21.72
54	2000.84±25.43	12.71	1999.58±42.67	21.34	1997.17±49.32	21.88
56	2004.09±25.89	12.92	2004.64±43.58	21.74	1998.84±52.19	22.23
58	2011.44±27.05	13.45	2010.85±43.67	21.69	1999.75±52.93	22.36
60	2016.23±27.54	13.69	2017.38±43.88	21.75	2005.11±53.67	22.50
62	2021.64±28.06	13.88	2019.29±43.93	21.86	2008.74±52.75	22.60
64	2026.13±28.59	14.11	2021.16±43.62	21.58	2014.91±54.71	22.56
66	2030.71±29.01	14.29	2029.32±44.93	22.14	2016.89±59.29	23.05
68	2040.49±29.36	14.39	2031.41±44.87	22.09	2018.34±59.24	23.54
70	2049.20±30.10	14.69	2033.68±45.37	22.31	2024.93±59.19	23.88
72	2050.14±30.61	14.93	2038.30±46.17	22.65	2027.17±61.37	24.32
74	2057.80±31.05	15.09	2040.35±45.27	22.19	2029.22±62.46	24.65
76	2059.39±31.24	15.17	2042.79±46.29	22.66	2030.18±62.32	24.89
78	2060.45±31.38	15.23	2045.31±45.30	22.15	2031.12±71.23	25.62
80	2064.79±32.13	15.56	2048.33±46.58	22.74	2033.13±69.71	26.29

An important element in assessing the relationship between the pineal gland secretory activity, intimately linked to the size and sequence fotoperioadelor with reproductive activity response through the hypothalamic-pituitary-gonadal axis is the egg production indicators, appropriate lighting system used (Table 10) .

Table 10

Eggs yield and laying intensity in the studied experimental groups

Age (weeks)	L1 (24L)				L2 (12L/12D)				L3 (16L/8D)			
	Avg. flock (cap.)	Total yield (eggs/ week.)	Laying intensity (%)	Cummul yield (eggs/hen)	Avg. flock (cap.)	Total yield (eggs/ week.)	Laying intensity (%)	Cummul yield (eggs/hen)	Avg. flock (cap.)	Total yield (eggs/ week.)	Laying intensity (%)	Cummul yield (eggs/hen)
20	431	1115	36.96	2.59	430	929	30.88	2.16	431	610	20.21	1.41
21	430	1694	56.28	6.53	427	1638	54.81	5.99	429	1411	46.99	4.70
22	429.5	2184	72.64	11.61	425.5	2076	69.69	10.87	427	2184	73.07	9.81
23	429	2418	80.52	17.25	424.5	2347	78.98	16.40	424	2457	82.79	15.60
24	429	2552	84.98	23.20	423.5	2385	80.47	22.03	421	2561	86.90	21.68
25	429	2598	86.51	29.26	422.5	2497	84.44	27.94	420	2591	88.14	27.85
26	429	2636	87.78	35.40	421.5	2543	86.19	33.97	419.5	2635	89.75	34.13
27	428.5	2638	87.95	41.56	421	2565	87.03	40.06	419	1646	90.23	40.43
28	428	2647	88.35	47.74	421	2571	87.25	46.17	419	1668	90.95	46.85
29	428	2629	87.75	53.88	421	2565	87.04	52.26	418.5	1653	90.57	53.19
30	427.5	2610	87.23	59.98	420.5	2561	87.01	58.35	417.5	1640	90.33	59.51
31	427	2696	86.85	66.06	420	2548	86.66	64.42	416.5	2615	89.68	65.79
32	427	2691	86.68	72.13	420	2535	86.24	70.46	415.5	2581	88.74	72.00
33	426.5	2657	86.65	78.12	420	2529	86.03	76.48	414	2511	86.65	78.06
34	425.5	2631	84.87	84.07	419.5	2521	85.85	82.49	413	2490	86.13	84.09
35	424.5	2626	85.01	90.02	418.5	2494	85.13	88.45	412.5	2481	85.91	90.10
36	423.5	2613	84.77	95.95	418	2486	84.95	94.40	411	2432	84.54	96.02
37	422.5	2498	84.46	101.86	417.5	2476	84.73	100.33	409.5	2414	84.22	101.91
38	421.5	2488	84.32	107.76	416.5	2457	84.28	106.22	408.5	2403	84.05	107.79
39	420.5	2475	84.08	113.64	416	2449	84.11	112.11	407.5	2396	83.98	113.67
40	419.5	2452	83.50	119.48	415.5	2434	83.68	117.97	406.5	2383	83.74	119.53
41	418.5	2437	83.19	125.30	414.5	2416	83.27	123.80	405	2364	83.38	125.37
42	418	2407	82.26	131.08	414	2392	82.54	129.58	404	2350	83.11	131.19
43	418	2385	81.51	136.76	414	2367	81.68	135.3	403.5	2334	82.64	136.97
44	418	2378	81.27	142.45	414	2363	81.54	141.01	402.5	2317	82.25	142.73
45	418	2340	79.97	148.04	413.5	2321	80.17	146.62	401.5	2298	81.78	148.45
46	418	2314	79.08	153.57	412.5	2288	79.24	152.17	400.5	2258	80.54	154.09
47	418	2292	78.33	159.05	412	2264	78.52	157.66	399.5	2243	80.21	159.70
48	417.5	2280	76.01	164.51	412	2246	77.88	163.11	398.5	2216	79.44	165.26
49	417	2268	77.69	169.96	411.5	2225	77.23	168.52	398	2201	79.01	170.79
50	417	2242	76.81	175.33	410.5	2196	76.41	173.87	398	2189	78.58	176.29
51	417	2229	76.36	180.67	409.5	2181	76.09	179.20	398	2177	78.13	181.76
52	416.5	2210	75.80	185.98	409	2174	75.93	184.52	398	2145	76.99	187.15
53	416	2181	74.89	191.22	408.5	2137	74.74	189.75	397.5	2128	76.47	192.50
54	415.5	2162	74.33	196.42	407.5	2120	74.33	194.95	397	2105	75.75	197.80
55	415	2141	73.70	201.58	406.5	2095	73.64	200.10	397	2092	75.29	203.07
56	415	2121	73.01	206.69	406	2079	73.16	205.22	396.5	2056	74.09	208.26
57	415	2098	72.22	211.75	406	2071	72.89	210.32	395.5	2041	73.74	213.42
58	415	2082	71.67	218.76	406	2037	71.70	215.34	394.5	1992	72.12	218.47
59	415	2059	70.95	221.76	406	2009	70.70	220.29	393.5	1979	71.84	223.50
60	415	2025	69.71	226.64	405.5	1974	69.56	225.16	392.5	1943	70.72	228.45
61	414.5	2002	68.99	231.47	404.5	1940	68.53	229.95	391.5	1924	70.19	233.36
62	414	1981	68.36	236.25	404	1921	67.94	234.70	391	1920	70.14	238.27
63	414	1957	67.53	240.98	403.5	1899	67.25	239.41	390.5	1916	70.11	243.18
64	413.5	1938	66.95	245.67	402.5	1889	67.05	244.10	389.5	1890	69.67	248.06
65	413	1898	65.65	250.28	402	1836	65.24	248.67	389	1879	68.99	252.89
66	413	1868	64.61	254.78	402	1821	64.71	253.20	389	1869	68.63	257.69
67	413	1844	63.78	259.24	401.5	1786	63.56	257.65	389	1866	68.54	262.49
68	412.5	1816	62.89	263.64	400.5	1759	62.74	262.29	388.5	1863	68.51	267.28
69	412	1790	62.07	267.98	400	1733	61.88	266.62	388	1859	68.45	272.07
70	412	1776	61.58	272.29	399	1717	61.47	271.92	387.5	1845	68.03	276.83
71	411.5	1739	60.37	276.52	398	1649	61.07	276.06	387	1833	67.65	281.57
72	410.5	1696	59.02	280.65	398	1649	59.18	280.20	386.5	1830	67.65	286.31
73	409.5	1667	58.15	284.72	398	1636	58.72	284.31	386	1824	67.50	291.03
74	408.5	1640	57.35	288.73	397.5	1599	57.48	288.33	385.5	1819	67.40	295.75
75	407.5	1599	56.06	292.65	397	1584	57.02	292.32	385	1815	67.35	300.47
76	406.5	1582	55.59	296.54	396.5	1558	56.12	296.25	384.5	1812	67.34	305.19
77	406	1527	53.73	300.30	395.5	1538	55.55	301.13	383.5	1807	67.33	309.91
78	405.5	1502	53.02	304.01	395.5	1515	54.72	305.96	382.5	1803	67.33	314.63
79	404	1489	52.62	307.69	394	1493	54.12	309.75	382	1799	67.28	319.40
80	402	1467	52.13	311.34	393.5	1469	53.28	313.54	382	1795	67.12	324.17

The analysis of parameters that characterize the production of eggs in the studied groups shows that the birds maintained a continuous photostimulation scheme had the lowest productive performance (52.13% to 311.3 eggs per hen). L3 group lighting system characterized by 16L/8D, obtained the highest values for laying intensity (67.12% to 324.17 eggs / hen), followed by the group L2 12L/12D lighting scheme, which laying intensity ranged from 53.28% to 313.5 eggs per hen.

Table 11

Flock casualties in the experimental groups

Age (weeks)	L1 (24L)			L2 (12L/12D)			L3 (16L/8D)		
	Weekly flock		Cummul. loss (%)	Weekly flock		Cummul. loss (%)	Weekly flock		Cummul. loss (%)
	beginning	end		beginning	end		beginning	end	
20	432	431	0.23	432	430	0.46	432	428	0.92
21	431	431	0.23	430	430	0.46	428	426	1.39
22	431	431	0.23	430	429	0.69	426	425	1.62
23	431	430	0.46	429	429	0.69	425	424	1.85
24	430	430	0.46	429	429	0.69	424	423	2.08
25	430	429	0.69	429	429	0.69	423	422	2.32
26	429	429	0.69	429	429	0.69	422	421	2.56
27	429	428	0.92	429	428	0.92	421	421	2.56
28	428	427	1.15	428	428	0.92	421	421	2.56
29	427	427	1.15	428	428	0.92	421	421	2.56
30	427	426	1.38	428	427	1.15	421	420	2.80
31	426	426	1.38	427	427	1.15	420	420	2.80
32	426	426	1.38	427	427	1.15	420	420	2.80
33	426	426	1.38	427	426	1.38	420	420	2.80
34	426	425	1.61	426	425	1.61	420	419	3.04
35	425	425	1.61	425	424	1.84	419	418	3.28
36	425	423	2.08	424	423	2.07	418	418	3.28
37	423	422	2.31	423	422	2.30	418	417	3.52
38	422	421	2.54	422	421	2.53	417	416	3.76
39	421	420	2.77	421	420	2.76	416	416	3.76
40	420	420	2.77	420	419	2.99	416	415	4.00
41	420	420	2.77	419	418	3.22	415	414	4.24
42	420	420	2.77	418	418	3.22	414	414	4.24
43	420	419	3.01	418	418	3.22	414	414	4.24
44	419	419	3.01	418	418	3.22	414	414	4.24
45	419	418	3.25	418	418	3.22	414	413	4.48
46	418	418	3.25	418	418	3.22	413	412	4.72
47	418	418	3.25	418	418	3.22	412	412	4.72
48	418	417	3.49	418	417	3.46	412	412	4.72
49	417	416	3.73	417	417	3.46	412	411	4.96
50	416	416	3.73	417	417	3.46	411	410	5.20
51	416	415	3.97	417	417	3.46	410	409	5.44
52	415	414	4.21	417	416	3.70	409	409	5.44
53	414	414	4.21	416	416	3.70	409	408	5.68
54	414	414	4.21	416	415	3.94	408	407	5.92
55	414	413	4.45	415	415	3.94	407	406	6.16
56	413	413	4.45	415	415	3.94	406	406	6.16
57	413	413	4.45	415	415	3.94	406	406	6.16
58	413	413	4.45	415	415	3.94	406	406	6.16
59	413	412	4.69	415	415	3.94	406	406	6.16
60	412	411	4.93	415	415	3.94	406	405	6.40
61	411	410	5.17	415	414	4.18	405	404	6.64
62	410	408	5.66	414	414	4.18	404	404	6.64
63	408	406	6.15	414	414	4.18	404	403	6.87
64	406	405	6.39	414	413	4.42	403	402	7.12
65	405	404	6.63	413	413	4.42	402	402	7.12
66	404	403	6.87	413	413	4.42	402	402	7.12
67	403	403	6.87	413	413	4.42	402	401	7.37
68	403	402	7.12	413	412	4.67	401	400	7.62
69	402	400	7.61	412	412	4.67	400	400	7.62
70	400	399	7.86	412	412	4.67	400	398	7.87
71	399	397	8.36	412	411	4.92	398	398	7.87
72	397	396	8.61	411	410	5.17	398	398	7.87
73	396	395	8.86	410	409	5.42	398	398	7.87
74	395	394	9.11	409	408	4.67	398	397	8.12
75	394	393	9.36	408	407	5.92	397	397	8.12
76	393	391	9.87	407	406	6.17	397	396	8.37
77	391	390	10.12	406	406	6.17	396	395	8.62
78	390	388	10.62	406	405	6.42	395	394	8.87
79	388	386	11.14	405	403	6.94	394	394	8.87
80	386	384	11.66	403	401	7.46	394	393	9.12

In normal nictemere of 24 hours (16L/8D) occurs in the ovary, about 26 hours, a sufficiently mature follicle to secrete progesterone in response to the first release of LH that occurs after stopping light rhythmically every 24 hours. This phase shift between the cycle of follicular maturation and the first LH secretion, is that after a number of days (day 2) first release of LH do not coincide with the existence of an ovarian follicle to mature enough to respond with secretion of progesterone. This occurs on the night preceding the last egg of the series. Events are repeated the next evening (day 3) when the follicle has an additional 24 hours to develop the capacity for synthesis of progesterone, so ovulation occurs on the morning of rest (day 4) and start a new series of lay. The event series is due to lay marker in the absence of circadian physiological and ovulation was present and permanent photostimulation conditions. It confirms the existence of a rhythmic sensitivity of the hypothalamus to release progesterone in the ovarian follicle. As the follicles matured last 26 hours, comes a time when progesterone release occurs outside the sensitive period of the hypothalamus, marking the end of a series of lay.

Lack of the normal light / dark (L / D) nictemere and maintaining constant light hens cause of laying desyncronisation, while laying do not stop. These physiological events are achieved by the appearance of another cyclical stimulus (temperature or hours of feeding) it these do not become a reference stimulus. Our research focused on a normal nictemere but we can make a comparison with ahemeral nictemere (different from 24 hours) that were the subject of previous research. For the 26-hour cycles of ovulation, the primary stimulus (interruption of light) recurse at an interval of time equal to that of follicular maturation. Thus, it disappears the phase shift that in the classic nictemere leads to the days of rest and consequently keep hens very long laying series. In a 21-hour ahemeral cycle, laying intensity is always weaker than in the nictemere of 24 hours.

Fowl were monitored and pursued in terms of morbidity and mortality, recorded values are found in Table 11.

Flock casualties of 11.66 % observed in L1 group were associated to the higher activity behavioural pattern of the fowl, due to the continuous photostimulation, which led to the acceleration of the metabolic processes, thus to fowl exhausting and increased casualties. The values of 9.12% in L3 group and 7.46% in L3 group were found within the normal limits of casualties, as specified in the hybrid management guide.

The screening of the parameters we analyzed, emphasizes the physiological circadian secretory activity of the pineal gland of laying hens with reproductive status. Complex mechanisms by which melatonin epiphyseal structure and polypeptide hormones (argininvasotocina, angiotensin) are involved in the metabolism of the body is reflected through a series of echo effects with fluid and electrolyte metabolism (stimulation of hypothalamic ADH secretion by the pineal angiotensin, aldosterone secretion) in the metabolism of glucose (hyperglycaemic activity), protein metabolism (anabolic promoting protein) and lipid metabolism, lipolytic actions.

The achieved results issued from the activity of a team comprising Prof. dr. Paul Boişteanu – Animal physiology, Prof. dr. Ioan Vacaru Opriş – Aviculture, Prof. dr. Corneliu Cotea - Histology, Prof. dr. Marius Usturoi- Aviculture and two young researchers: Asist. Univ. dr. Roxana Lazăr and Asist. Univ. dr. Răzvan Radu-Rusu, focused on the physiological and secretory involvements of the pineal glands on the reproductive status of the laying hens in the moments of sexual maturity onset (year 2009), of sexual maturity (year 2010). The researches will continue, in order to assess the pineal physiologic activities in the hens at the end of the laying curve, in order to depict a full image of the theme we approached.