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EFFECTS OF *PORTULACA OLERACEA* LINN. AND EXTRA EGG® IN EGGS'STIMULATION IN ISA BROWN LAYER: COMPARATIVE STUDY

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ABSTRACT
The effects of *Portulaca oleracea* and Extra egg® are compared in stimulating egg's production in ISA Brown layers. 350 ISA Brown hens were divided into seven (7) equal lots. Levels of luteinizing hormone (LH) and Prolactin (PRL) were: 3703, 39 ± 30.34 mIU/L and 63, 18 ± 0.25 ng/ L with (0.5 g/L of water of *Portulaca oleracea* during three months and half), 2480.85 ± 169.95 mIU/L and 104.85 ± 11.52 ng/L (2 g/L of *Portulaca oleracea* for three months and half), 1910.39 ± 33.13 mIU/L and 540.92 ± 15.25 ng/L (2g/L of *Portulaca oleracea* for two months and half) (P <0.1%). The results of 1g/L of *Portulaca oleracea* and 1g/L of Extra egg® for 2 months and half are, in an order of succession, 890.46 ± 38.55 mIU/L against 861.29 ± 22, 06 mIU/L for LH and 575.08 ± 13.10 ng/L and 587.09 ± 6.40 ng/L for Prolactin (P> 5%). It appears that the treatment of 0.5 g/L water of *Portulaca oleracea* for three months and half induced the lowest feed conversion (2.21 ± 0.07). The powder of *Portulaca oleracea* stimulates egg's production in ISA Brown layers.

KEY WORDS: Egg's production, *Portulaca oleracea*, Extra egg®, ISA Brown.

INTRODUCTION

World population now stands about 5.5 billion people. Twenty five percent (25%) of the population receive adequate food or even in excess (more than 2800 calories per day on average, 40 grams of animal protein). In contrast, the remaining three quarters are in a state of malnutrition (Fedida, 1996).

Unfortunately, while raising chickens for egg's production is an activity whose magnitude is increasing. Benin market is invaded by several types of poultry products. So, many researchers tried to identify constraints to food and health of poultry farming in the Republic of Benin. But no investigation has been conducted on the effectiveness of local plants which are able to stimulate egg's production in layers. The number of molecules imported, become expensive for poultry breeders. They are often helpless against unfair competition from imported poultry products, sold at low prices. It is therefore essential to decrease the production's cost and promote the quality of local table eggs. The aim of this study is to use local plant *Portulaca oleracea* to stimulate egg's production in ISA Brown.

MATERIALS AND METHODS

The animal materials are 350 ISA Brow layers from the Society for the Promotion and Distribution Poultry (Soproda, France). The experimental chickens were submitted to the laying Feed whose characteristics are as follow: 2700 kcal ME / kg diet and 16% protein. The plant material consists in the powder obtained from dried leaves of the plant *Portulaca oleracea*. They were picked from the Department of the Atlantic and identified in the National Herbarium of the Faculty of Science and Technology (FAST) at the University of Abomey-Calavi.

Extra egg® is a Manufactured veterinary product, produced by the Laboratory Laprovet in France. Venoject 21 gauge needles were used for blood sampling at the wing vein of layers; the ELISA kit was used for determination of luteinizing hormone (LH) and Prolactin (PRL).

A total of three hundred and fifty (350) chickens were used (7 lots of fifty 50 layers). A staff of 5% was taken from each lot before and at the end of the test for hormone assays. Lot A, control group received no treatment for 3 months and half. Lot B is subjected to 0.5 g / L of water *Portulaca oleracea* powder for 2 months and half. Lot C received 0.5 g/L of water *Portulaca oleracea* powder for three months and half. Lot D received 1g/ L of water Extra egg® for 2 months and half. Lot E, 1g/L of water *Portulaca oleracea* powder for 2 months and half. Lot F, 2 g/L of water *Portulaca oleracea* powder for 2 months and half. Lot G received 2 g/L of water *Portulaca oleracea* powder for 3 months and half.

Each layer consumed 110g a day. The quantity of food distributed to each lot is weighted before distribution. The next day, the refusal food is weighted. The difference between the two weights is the weight of the food consumed by the lot. The eggs of each lot were weighted at the end of each day. The rate of lay is used to evaluate the number of layers that have laid indeed in the day compared to the number of live layers in each lot. The conversion ratio is the amount of food consumed, expressed in kilograms for a given egg mass, as expressed in kilograms. This index of conversion is calculated as the ratio between the weight of the food consumed and the mass of whole eggs during the period.

From the wing vein of each bird, an amount of about 5 ml of blood was collected in tubes and allowed to clot for Venoject hour. The serum obtained after coagulation was recovered using a Pasteur pipette, then collected in a tube retention of 2 ml and then stored frozen at -20 ° C for later use.

Determination of LH and Prolactin

The serum is removed from the freezer and brought to room temperature. The dosage of the hormone PRL was performed according to the ELISA kit. The same technique is used for the assay of LH.

The ANOVA test was used to compare the means of the zootechnical parameters in experimental layers and the rates of luteinizing hormone (LH) and Prolactin. The Newman-Keuls test was used to classify the average case of statistically significant difference.

RESULTS

Plasma levels of LH and Prolactin

Plasma levels of luteinizing hormone (LH) and Prolactin were: 3703, 39 ± 30.34 mIU/L and 63, 18 ± 0.25 ng/L (C treatment of 0.5 g / L *Portulaca oleracea* water for three months and half), 2480.85 ± 169.95 mIU/L and 104.85 ± 11.52 ng/L (G treatment of 2 g / L of *Portulaca oleracea* for three months and half); 1910.39 ± 33.13 mIU/L and 540.92 ± 15.25 ng/L (F treatment with 2 g/ L of *Portulaca oleracea* for two months and half) (P <0.1%). As for treatments E (1 g / L of *Portulaca oleracea* for 2 months and half) and D (1g/L of Extra egg® for 2 months and half); the results were in the order of succession for LH 890.46 ± 38.55 mIU/L against 861.29 ± 22.06 mIU/L and 575.08 ± 13.10 ng/L and 587.09 ± 6.40 ng/L for Prolactin (P> 5%) . It appears that the C treatment induced the lowest feed conversion (2.21 ± 0.07) against 3.06 ± 0.26 for control group and 2.91 ± 0.22 for treatment B (0, 5 g/L of *Portulaca oleracea* for two months and half) (figure 1).

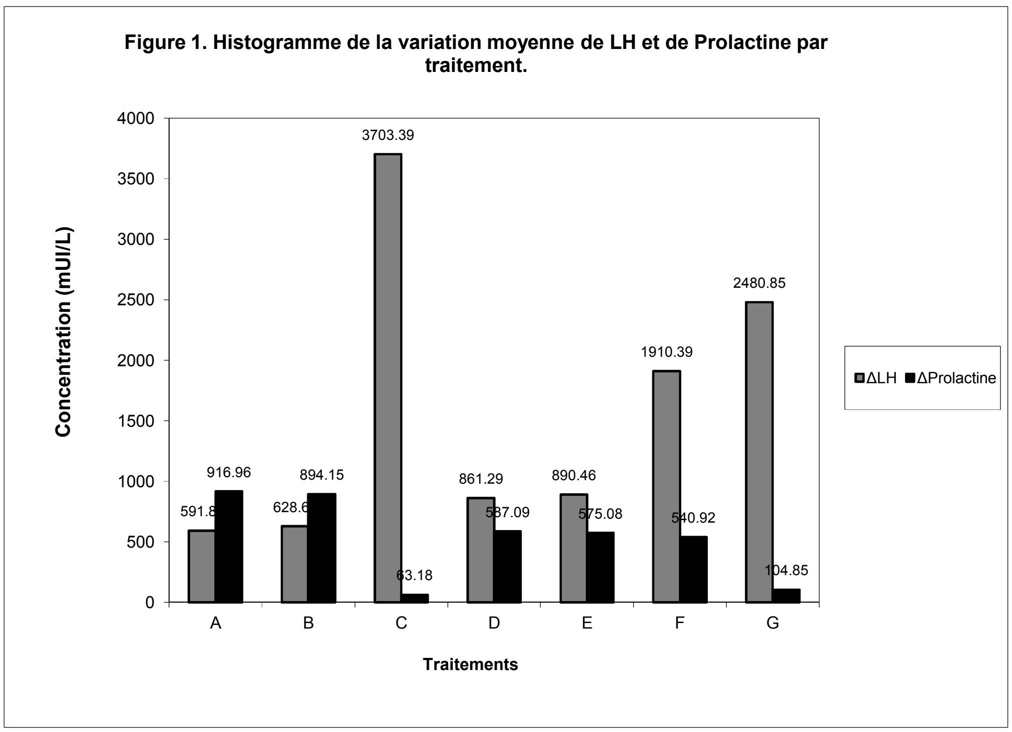

FIGURE 1: Levels of LH and Prolactin (PRL)

Zoo technical parameters

Layers submitted to treatment C (0.5 g/L water *Portulaca oleracea* for three months and half) consumed 5.18 ± 0.10 kg of food with the highest production of eggs (42, 68 ± 0.68), the higher rate of lay and the lowest feed conversion (2.21 ± 0.07) (tables 1, 2 and 3).

Table 1: Average amount of food consumed and average number of eggs produced for different treatments.

Treatments	N	Food consumption (kg)	Egg production
A	15	5,24±0,08 A	38,25±0,07 C
B	15	5,16±0,10 A	38,31±0,08 C
C	15	5,18±0,10 A	42,68±0,68 A
D	15	5,02±0,14 A	38,87±0,06 B
E	15	5,26±0,12 A	40,46±0,53 B
F	15	5,31±0,07 A	40,55±0,63 B
G	15	5,22±0,08 A	41,40±0,60 AB
Probability	-	0,54	**0,02**
CV%	-	7,64	10
Conclusion	-	no significant difference at 5%	No significant difference at 5%

TABLE 2: Rate of production and weight of egg

Treatments	N	Rate of production (%)	Weight of eggs
A	15	66,82±4,72 D	61,78±0,72 A
B	15	78,67±0,15 C	62,24±0,73 A
C	15	89,09±0,92 A	61,63±0,73 A
D	15	80,51±2,46 B	62,62±0,71 A
E	15	82,81±1,21 B	63,01±1,09 A
F	15	82,95±1,26 B	63,16±0,56 A
G	15	84,57±1,14 B	61,90±0,51 A
Probability	-	0,0001	0,67
CV%	-	11,14	4,62
Conclusion	-	significant difference at 0,1%	no significant difference at 5%

TABLE 3: Weight of eggs (kg) and average index of conversion

Treatments	N	Weight of eggs	Index of conversion
A	15	1,88±0,13 A	3,06±0,26 A
B	15	1,89±0,11 A	2,91±0,22 A
C	15	2,37±0,06 A	2,21±0,07 C
D	15	1,99±0,13 A	2,66±0,17 B
E	15	2,77±0,64 A	2,56±0,12 B
F	15	2,13±0,07 A	2,54±0,11 B
G	15	2,17±0,06 A	2,46±0,09 B
Probability	-	0,19	0,009
CV%	-	46,18	24
Conclusion	-	no significant difference at 5%	significant difference at the 0,1%

DISCUSSION

Plasma concentrations of luteinizing hormone (LH) and Prolactin (PRL)

The role of LH in ovulation is known. This hormone has a peak on the 14th day of the menstrual cycle a few hours before ovulation. The plasma concentration increases from 10 to 15 mIU/ mL in women (Schmitt, 1980). The plasma concentration of this hormone in layers of the control that received no treatment was 591.85 ± 3.92 mIU / mL. One could deduce that the level of the plasma concentration of LH in ISA Brown hens is different from that of women. The plasma concentration of Prolactin at the time of ovulation peak of LH in women varies from 4 to 35ng/mL; the concentration of this hormone in layers of the control was 916.96 ±11.72 ng/L. This value is lower than that found in women. These changes in plasma levels of LH and Prolactin in layers confirm the experimental analysis of Schmitt (1980). He argued that the plasma levels of LH and Prolactin depende on gender, age, species and its physiological state. When Prolactin levels is greater than 500 ng/ mL in women, it would be a macroadenoma, while a rate greater than 100 ng / mL for LH reached a sign except in times of ovarian ovulatory peak. The results of figure 1 show that the level of luteinizing hormone was significantly higher in layers of Lot C and lower in layers of lots A and B. So there is no significant difference in lots A and B. Similarly, treatments D and E are not statistically different for LH. About the rate of Prolactin, the control group and treatment B have the most important rate of Prolactin and the treatment C the lowest.

Analyzing the plasma level of the different treatments, we see that in treatment C, the level of LH was highest; it is followed by treatments G, F, E, D, B, and finally treatment A.

About the plasma levels of Prolactin, the dose and also the duration of treatment had an effect on the level of plasma LH and Prolactin. If the processing time is longer (3 months and half) for lots C and G, we have the highest concentrations of LH and the lowest level of Prolactin. These results are the same with those obtained by Sharp et al., (1993). We can conclude that, the stimulating egg factors must to be distributed for a long time even at a low doses. This well-known practice is realised by the breeders poultry in Benin. They used to distribute drugs rich in vitamins and amino acids in water for the layers. These products and stimulating egg's production can have positive effects against the stress (excessive temperature, humidity, etc.) commonly found in tropical countries (Little, 1991). These stresses are often the basis of high plasma levels of Prolactin with its corollary reflex brooding. To this end, *Portulaca oleracea* distributed in low doses during a long time gives equal t or best results than Extra Egg®). The levels of LH depend of the physiological functioning of the central nervous system. Any factor that fight against stress, promotes the release of LH, inhibits Prolactin secretion and therefore reduces the reflex in breeding hens (Crisostomo et al., 1998).

Zootechnical parameters

The food is a principal factor in egg's production. The quantity and quality of the food influence the production of layers. According to Jourdain (1990): "the hen lays by the beak". The amount of food consumed by each group experimental (110g per day/layer) is the same with what is proposed by Petit (1991) which recommends a diet of 110 to 115 g /day for ISA Brown. This ration, with energy level of 2750 kcal / kg diet was given to the layers during the test. Statistical analysis showed no significant difference between the amount of food consumption in relation to different treatments. The different treatments did not influence the level of food consumption. According to the Institute of Animal Husbandry and Veterinary Medicine in tropical countries (IEMVT, 1983), the level of food consumption depends of the breeding way of the animals, the temperature, the shape and the composition of the ration. However in respect of egg's production, the treatment C (0.5 g/L water *Portulaca oleracea* for 3 months and half) increases the production of eggs, the highest level with 42.68 ± 0.68. This means that, although the food consumption is not significatevely different between the different lots, the best performance is obtained with the treatment C. The duration of treatment may influences also this result. The plant *Portulaca oleracea* contains substances likely vitamin which, when used at low doses and for a long period would be beneficial for egg production in the layers.

Laying rate and average weight of the egg

The test structure averages of Student Newman-Keuls showed that for the rate of lay, the control group recorded the lowest rate and Lot C, the highest rate (89.09 ± 0, 92). There is statistically no significant difference between treatments D, E, F and G. The average rate of lay of Lot B is statistically lower than the other but higher than the control. The Rates obtained with the different treatments except the control group are equal with those proposed by (ISA, 2000). The rate of production in layers is from 80 to 92.5%; depend the age from 18 to 33 weeks. The rate of production relatively low (66.82 ± 4.92) in the control lot may be explained by the fact that the layers did not receive any anti-stress during the test period. This situation probably affects the production in a tropical environment where the risk of stress is permanent.

Average mass of eggs and average index of conversion

The mass of the egg and feed efficiency are parameters which are livestock profitability criteria in laying hens. According to Jourdain (1990), the selection of the layers is a criteria in the performance of the layers. Also, the feed conversion rate is costly for the breeders in point of view of the quality of the cost production (Blum, 1989). There is no significant difference between the different masses of medium eggs except Lot C. The value of 2, 21 ± 0.07 obtained as an index of conversion for this lot is less than that proposed by Blum (1989). This author proposes a value of 2.40 at the age of 32 weeks in layers. This value (2.40) is less than that observed for other treatments, with a maximum level of 3.06 ± 0.26 for the control group. In other words, this lot was used to produce an egg mass less than the others. This explains the effect of treatment on feed conversion in chickens experimental. The value obtained for feed efficiency even with treatment D corresponding to Extra Egg® is higher than that obtained with *Portulaca oleracea* at 0.5 g / L of water for 3 months and half. Some authors such as Blum (1989), Jourdain (1990) linking the conversion index for food and egg mass production. One could also consider the influence of the treatment during the production phase.

CONCLUSION

This study compared the effects of anti-stress of *Portulaca oleracea* and Extra egg® in stimulating egg's production in ISA Brown. Analysing the results, it appear:

i) *Portulaca oleracea* like Extra egg®, is an anti-stress or has egg's stimulating property in layers ISA Brown;

ii) The powder of the plant of *Portulaca oleracea* used in drinking water at different concentrations (0, 5 g / L of water for 3 months and half, 2 g / L of water for 3 months and half; 2 g /L water for 2 months and half, is more effecient than the Extra egg® used at the recommended dose of 1 g/L of water in stimulating egg's production. *Portulaca oleracea* powder may be recommended in stimulating egg's production in ISA Brown layers.

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