FORCE-MOULTING METHOD FOR EGG PRODUCTION STABILISATION IN LAYER CHICKENS FED SUNDRIED CASSAVA PEEL AND SHEA NUT CAKE BASED DIETS FLAVOURED WITH MOLASSES

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ABSTRACT

Moulting in avian species is the periodic shedding of feathers, a reproductive quiescence found to be incomplete, resulting to low rate of lay for a prolonged period, the need to meet up with the rising demand for eggs has necessitated "Forcing" the onset of moulting. The present work evaluated the effectiveness of a less technical method on the stabilization of egg production in layer chickens fed MFSCPM and MFSNC diets (The control diet with 0% inclusion level of both MFSNCM and MFSCPM, 10 % MCP was 10% MFCPM inclusion, 20 % MCP was 20% inclusion of MFCPM, 10 % MSN was 10% inclusion of MFSNC and 20 % MSN was 20% inclusion of MFSNC). Force moulting procedure in this study commenced when the birds have laid for up to five months (152 days) and then the quantity of daily eggs laid began to reduce. The force moulting lasted over a period of 15 days. The birds were fasted for three days, and given half of their usual feed on the fourth day. But there was ad libitum access to water. Day length was also reduced from 18h – 12h day length. A satisfactory level of moulting was ascertained when most of the plumage fell off and beyond 25 % body weight had been lost all throughout the flock. The results of of all the parameters considered showed that there was no significant (P>0.05) difference between treatments. It can therefore be said that all the experimental diets supported a successful moulting procedure in this study.

Keywords: Shea nut cake, Moulting, *ad libitum*, Day-length, Fasting, laying chickens

INTRODUCTION

There is the need for change in the style of chicken egg farming in order to meet up with the rising demand for egg by upgrading the production facilities while keeping in mind the health and welfare of their birds; and also putting into cognizance the need to deliver eggs to the market in the most economical and quickest manner possible. The decrease in prices for spent layers generated interest in methods by which the natural moult could be avoided and flocks kept for more than one year. "Forcing" the onset of moulting to occur other than at the time of the natural moulting completely halted reproductive function and precipitated a loss of feathers. Egg production resumed and increased rapidly to a profitable rate following this artificial moult (Berry, 2003). Thus, the term "forced moulting" was coined. Conventional induced moulting usually involves removing feed, water, or both from the hens and reducing the photoperiod to that of natural day length or less. The average age to moult a flock was determined to be 69 weeks of age. Attempts to molt younger flocks between 57 and 66 weeks of age will be hampered by the hen's persistency of production and resistance to ceasing production, especially hens with larger body characteristics such as the brown egg strains, which may never totally cease production. In many of these instances, the hens will likely not experience a complete regression and rejuvenation of the reproductive tract. However, this does not mean the improved egg quality and productivity will not occur. On the other hand, if the flock is more than 75 weeks old, the potential for restoring egg production and shell quality is greatly diminished, and the overall economic advantage of an induced molt is considerably reduced. The second laying cycle of the flock should end at 105 to 110 weeks of age (Anderson and Havenstein, 2007). The complete removal of feed for 10 to 14 days combined with reduced day length from 16 to 8 hours remains the best method (Bell, 2003). So many researches have been conducted extensively in a bid to develop effective methods to moult hens without feed withdrawal including: Low-sodium diets, high-Zn diets, some pharmaceuticals like enheptin, nicarbazin, methallibure and tamoxifen (Ruszler, 1998) and also injection of gonadotropin-releasing hormone agonist (Attia *et al*., 1994). However, neither of

the alternative methods is widely practiced in the industry due to cost and inconsistent results. Factors that lead to low egg productivity and availability in layer chickens include disease outbreak, improper feeding regimes, unsuitable environmental conditions, seasonal change or variation and over feeding.Thus the aim of the study was to realize a less technical procedure egg production stabilizing method in laying chickens that will help to satisfy the demand for eggs as a source of human protein especially if it also helps in reversing dwindling decline in egg production brought about by any of the factors earlier mentioned. It is at this juncture that such process as force moulting will give the farmer hope on improving egg production without decreasing overall egg acceptability by consumers.

MATERIALS AND METHODS

The study was conducted at the Integrated Farm Unit, Aquaculture and Biotechnology Department, National Institute for Freshwater Fisheries Research (NIFFR), New Bussa, Niger State. New Bussa is located between latitude 9˚52'59.0"North and longitude 4˚30'40.2'' East in the southern guinea savanna zone of north central Nigeria, with the minimum and maximum temperatures of 39 ℃ and 42 ℃, respectively with a mean annual rainfall of about 1000 mm (Raji *et al.,* 2011).

Source of raw materials

Sundried cassava peels were bought from New Bussa open market, milled into fine size at the NIFFR feed meal, bagged and stored in sacks (Uwankwo and Ibeawuchi, 2014). Sheanut cake was obtained and processed in NIFFR integrated unit from sheabutter cottage producers in Karabonde village, Borgu Local Government Area of Niger State, Other macro-ingredients including maize, molasses, soyabeans, groundnut cake, wheat offal, maize bran and micro-ingredients; salt, lysine, methionine and vitamin premix were all purchased within New Bussa town.

Force moulting procedure

Force moulting procedure commenced when the birds have laid for up to five months and then the quantity of daily eggs laid began to reduce. The force moulting lasted over a period of 15 days. The birds were fasted for three days, and given half of their usual feed on the fourth day. But there was *ad libitum* access to water. The moulting procedure used in this study is an improvement on the method of Bell, (2003) where it was stated that " complete removal of feed for 10 -14 day combined with reduced day length from 16 – 8 hours remains the best moulting procedure" Day length was also reduced from 18h – 12h day length. A satisfactory level of moulting was ascertained when most of the plumage fell off and beyond 25 % body weight had been lost.

Determination of weight loss and morphological characteristics

The force moulted chickens were strictly observed for any deviation from normalcy at the feather, comb, wattle, earlobes, eye rings, shanks, toes and vent of the chickens were visually observed and recorded, this method is an improvement on the method described by Oguike *et al.,* (2005). The layer chickens were weighed on a weekly basis and data was collected, visual observation was used to record data for feather loss, eye rings pigmentation, ear lobes, vent, shank, toes, beak, and foot. Fingers were used to determine the width of the pubic bone and abdominal capacity. The number of finger that the abdomen and pubic bone area contains is recorded until the pubic bones contained only one (1) finger and the abdominal capacity (space between the abdomen and keel bone) contained two (2) fingers. Numbers were allotted to the recorded visually observed data (0 to represent no result, 1 to represent early stage and 2 to represent the satisfactory stages of pigmentation).

Data Analysis

Data collected were analyzed using Statistical Package for Social Science (SPSS) version 23. Where means were significant, they were separated using the Duncan multiple range test as contained in the package.

RESULTS AND DISCUSSION

Weight loss and morphological changes of layer chickens fed MFSCP and MFSNC diets during force-moult.

The results of weight loss and morphologically observed effects of moulting exercise on layer chickens fed MFSCP and MFSNC are presented in Table 1. Initial weight and weight loss mean values of (1.79 kg and 0.60 kg) obtained respectively were highest for forced moulted layer chickens in 10% MSN treatment but they were not significantly different from the remaining treatment mean values. Final weight mean value of 1.20 kg was obtained for forced moulted layer chickens in 10%

MCP treatment, but no significant (P>0.05) difference was observed between treatments. Feather loss was highest with a mean value of 1.33 for force-moulted layer chickens in both control and 10% MSN treatments, however, it was not significantly (P>0.05) different from other the treatment means. The

Table 1. Weight loss and morphology of layer chickens fed MFSCP and MFSNC diets during force-moult.

Parameter	Control	10%MCP	20%MCP	10%MSN	20%MSN	SEM	P-val	L/SIG
In wt (kg)	1.63	1.73	1.72	1.79	1.70	002	0.30	Ns
F wt (kg)	1.13	1.20	1.15	1.18	1.11	0.02	0.78	Ns
Weight loss(kg)	0.50	0.53	0.57	0.60	0.59	0.03	0.88	Ns
Feather loss	1.33	1.00	1.22	1.33	1.11	0.11	0.87	Ns
Pubic bone	1.67	1.50	1.83	1.61	1.39	0.09	0.63	Ns
Abdomen	2.78	2.67	2.67	2.67	2.67	0.10	1.10	Ns
Vent	0.89	0.78	0.78	1.00	1.00	0.12	0.95	Ns
Eyering	0.56	0.67	0.67	0.56	0.56	0.09	0.99	Ns
Earlobe	0.00	0.00	0.00	0.00	0.00	0.00	-	Ns
Beak	0.78	0.67	0.56	0.89	0.78	0.11	0.90	Ns
Foot	1.00	1.22	1.11	1.00	1.11	0.13	0.98	Ns
Toes	0.67	0.78	0.67	0.56	1.00	0.11	0.758	Ns
Shanks	0.00	0.00	0.00	0.00	0.00	0.00	-	Ns

NS: means along the rows are not significantly (P<0.05) different, In wt = initial weight, F wt = final weight. 10%MCP = 10% inclusion of molasses fortified cassava peel meal, 20%MCP = 20% inclusion of molasses fortified cassava peel meal**,** 10%MSN = 10% inclusion of molasses fortified shea nut cake, 20%MSN = 20% inclusion of molasses fortified shea nut cake.

mean values obtained for pubic bone, abdomen, vent eye ring, beak, foot and toes showed that there was no significant (P>0.05) difference between treatments. Meanwhile, no deviation from normalcy was observed on the ear lobes and shanks of the forced moulted layer chickens. The moulting period in this study lasted for a period of fifteen (15) days, and this was in line with the report by Oguike *et al*. (2005) and Hassanabadi and Kermanshahi (2007) that layer chickens were fully force – moulted using feed withdrawal method by the 14th day, and 16th day respectively. The data obtained on weight loss and morphological changes showed no significant (P>0.05) differences between the treatments for all the parameters observed. However, the weight loss recorded through the period of moulting was beyond 25 % as a range of 50 – 60 %, this can be attributed to the fact that the layers were moulted early and might be yet to attain their full body weight potential as suggested by Ocak *et al.* (2004), that lighter hens loose more weight during molting. However, the percentage weight loss attained by force – moulting in this study was lower than the report by Alodan and Mashaly (1999) that the body weight of molted hens decreased significantly to about 84, 75 and 88% of the initial body weight for high Zn diet, california treatment and ON-OFF groups of moulting techniques respectively. Meanwhile, the result obtained in this study was higher than the weight loss result of 25 % reported in molted layers by Oguike *et al*. (2005). The layer chickens in this study were force - moulted at 42 weeks of age and egg production stopped immediately on the third 3rd day of fasting which could be attributed to complete feed withdrawal as suggested by Peebles *et al.* (2004) owing to resultant changes the normal physiology caused by fasting in terms of reduced digestive enzyme, serum cholesterol, triglycerides and very low density lipoproteins, which are important for egg production. No pigmentation was observed on the ear lobes and shanks of the chickens, this could probably be because they were force moulted at an early age. All other parameters observed for all the treatments were positively in line with the laying and moulting jugdement guide on (weight loss, process of feather loss, pubic bone, abdominal and vent assessment steps, and also steps in carrying out observation for coloration of the ear lobes, beak, foot, eye ring, shanks and toes) provided by Ellis (2004) and Clauer *et al.*, (2021). It can therefore be said that all the experimental diets supported a successful moulting procedure in this study.

Acknowledgements
The assistance of Mr. Haliru Salihu, a casual staff of the Integrated Unit and Abdulsalam Ogah (Corp member) in carrying out the force moulting procedure is highly acknowledged. This paper is published with the permission of the Executive Director of National Institute for Fresh Water Fisheries Research Institute, New Bussa, Nigeria.

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