

## Effects of skip a day (SAD) feeding regime during rearing on the subsequent laying performance of Black Harco hens

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### Abstract

One hundred and fifty (150) black harco pullets were used in a study designed to investigate the effects of Skip A Day (SAD) feeding regimen during rearing on their laying performance. Pullets from a healthy stock were randomly allocated into five experimental groups at 12 weeks of age. Birds in group 1 were fed *ad libitum* daily, while those in groups 2, 3, 4 and 5 were subjected to SAD feeding regimen for 2, 4, 6 and 8 weeks, respectively. Hens in all groups were thereafter fed *ad libitum* during a 30-week laying period. Birds in all treatment groups had unrestricted access to water before, during and after the period of feed restriction. Results at the end of the experiment showed that total number of eggs laid as well as Hen Day Production (HDP%) were significantly highest in hens previously subjected to SAD feeding for 6 weeks during rearing ( $p < 0.05$ ). Although feed intakes of pullets were significantly reduced by subjecting pullets to periods ranging from 2 – 8 weeks of SAD feeding during rearing ( $p < 0.05$ ), feed intakes during laying period were not significantly affected ( $p > 0.05$ ). However, feed per dozen egg as well as cost per dozen egg were significantly reduced among hens previously subjected to either 6 or 8 weeks of SAD feeding during rearing ( $p < 0.05$ ). Egg weight as well as egg diameter were similar among hens in all dietary treatments ( $p > 0.05$ ). SAD feeding programme did not significantly affect hens livability ( $p > 0.05$ ). It was concluded that, subjecting black harco hens to SAD feeding for 6 weeks during rearing period in place of *ad libitum* feeding, could improve laying efficiency.

Keywords: Harco pullets, Skip a Day, *ad libitum*, Hen Day Production, Cost/ dozen egg, Feed/ dozen egg

### Introduction

It is now realized that correct pullet rearing programmes are essential for optimum economic returns in the layer house. Management of pullets at the growing period is generally aimed at producing birds that are physically and physiologically mature at the point of lay. Rearing has been described as weight and lighting management (Leeson, 2001).

Feed restriction during rearing helps maximize settable egg production, improve production persistency and maintain egg quality during the breeding period (Yu *et al.*, 1992). Generally, feed restriction

during the rearing period reduced body weight, delayed sexual maturity, increased the intensity of egg production once the delay in sexual maturity has been overcome, increased egg size and reduced carcass fat content (Blair, 1972, Gowe *et al.*, 1960). During laying, restricted hens have also been found to be more efficient converters of feed into eggs compared to the unrestricted (Akinokun *et al.*, 1985).

Feed restriction during rearing can be qualitative or quantitative. Qualitative feed restriction may involve reducing caloric and or protein content of the formulated feed or amino acid imbalance while still

presenting the feed *ad libitum* to the hens. Quantitative feeding on the other hand, involves physically restricting feed intake to certain percentage of *ad libitum* feeding daily or fasting birds through Skip a Day (by which birds are offered feed every other day for desired number of weeks) or Skip two Day (by which birds are denied access to feed for two consecutive days for a desired number of weeks) feeding method. Cier *et al.*, (1985) reported that the body weights of broiler breeder pullets raised on a Skip a Day feeding regime were consistently inferior to those of pullets on a daily feed restriction. It was also reported that pullets raised on a Skip a Day and Skip two Day feeding regimen required 5 and 11% more feed respectively, than daily restricted pullets in order to reach identical body weights at 22 weeks of age (Cier *et al.*, 1985). When broilers of mixed sex were subjected to varying periods of feed restriction ranging from Skip a Day feeding regimen for 1 week to 5 weeks significant decreases in both feed intake and body weights of birds were recorded (Oyedemi *et al.*, 2003).

Reports on the effect and duration of Skip a Day feeding during pullets rearing on the subsequent laying performance of hens either for table eggs or breeder eggs in the humid tropics are not yet widely documented. Such information is important both from the point of view of improving egg production as well as exploring possibilities for more efficient use of feed. This study was therefore planned to investigate the effect of Skip a Day feeding regimen on hens during rearing, on the subsequent performance and laying efficiency of black harco pullets in the humid tropics.

### Materials and Methods

#### Birds and Diets

One hundred and fifty (150), 12- week old

black harco pullets raised under similar management conditions were used in an experiment conducted at Benson Idahosa University Teaching and Research Farms. Benson Idahosa University is located in Benin City, in the southern rain forest zone of Nigeria. The strain of hens used was of light breed with predominantly black plumage. Body weight at point of lay averaged 1.5 kg per hen. Selected hens were of good health having been taken through routine vaccinations. The hens were weighed individually and housed in battery cages mounted in an open sided building. There were 5 rows of 30 birds each. Each row contained 15 cage units of 2 hens each and unit cage size was 38.0cm by 38.8cm to provide 737.2 square cm per bird. The day length at the period was natural, approximately 12hours and the prevailing temperature was 32°C. The experiment was conducted during the dry season with relative humidity in the room averaging 55%. Two weeks prior to the feeding trials, the birds were randomly distributed into five treatment groups viz Full Feeding by which hens were fed *ad libitum* (control) daily, Skip A Day (SAD) for 2 Weeks, SAD for 4 Weeks, SAD for 6 Weeks and SAD for 8 Weeks. The Skip A Day (SAD) feeding was applied in a way such that hens were only offered feed every other day for the respective number of weeks the feeding regimen was applied for each group. Each group was replicated fifteen times making a total of 75 experimental units. During rearing, pullets in all groups were fed the formulated grower mash shown in table 1. Feeding was done according to their respective feeding regimen. At 20 weeks of age when the birds started laying, they were again weighed individually. Hens in all groups were thereafter fed *ad libitum* with the layer mash shown in table 1 for another 30 weeks. Birds had unrestricted

**Table 1: Composition of growers and layers diet fed to pullets in all treatment groups(%).**

Ingredients	Percentage	
	Growers Diet	Layers Diet
Yellow Maize	60.00	61.68
Soyabean meal	17.47	20.00
Brewer's dried grains	6.27	-
Maize offal	10.45	-
Wheat offal	-	6.22
Blood meal	2.94	-
Fish meal	-	2.00
Bone meal	1.94	1.50
Oyster shell	0.33	7.50
Salt	0.25	0.25
Vit./Min.Premix	0.25*	0.50**
D.L Methionine	0.10	0.35
TOTAL	100.00	100.00

## Calculated Nutrient Content

Dry Matter %	97.24	96.12
Protein %	16.10	17.20
Fat %	2.59	3.00
Fibre %	4.13	4.00
ME Kcal/Kg	2850	3024.00

\* Provides per kg of diet, vitamin A(8000iu), vitamin D3(1,200iu); vitamin E(31iu); vitamin K3 KASTAB(2mg); vitamin B2 Nicotinic acid (10mg); vitamin B5 Panthothenic acid(150mg); Manganese(Mn)(80mg); Zinc(Zn)(50mg); Copper(Cu)(2mg); Iodine(I)(1.2mg); Cobalt(Co)(2mg); Selenium(Se)(0.1mg).

\*\* Provides per 2.5kg of diet, Vit A(8500000)iu; Vit.D(1500000iu) Vit E(10000)mg; Vit K(1000)mg; Vit.B1(1500)mg; Vit.B2 (4500)mg; Vit.B6 (3000)mg; Vit.B12(15)mg; Niacin(15000)mg; Panthothenic acid(4500)mg; Folic acid(600)mg; Biotin(500)mg; Choline chloride(175000)mg; Manganese(Mn)(40000)mg; Zinc(Zn)(30000)mg; Iron(Fe) (20000)mg; Zinc (Zn)(30000)mg; Copper(Cu)(3000)mg; Iodine(I)(1000)mg; Cobalt(Co)(200)mg; Selenium(Se)(200)mg; Antioxidant(1250)mg.

access to clean drinking water before, during and after period of feed restriction.

#### *Data Collections*

Throughout the duration of the study, weekly records of feed intake were taken by weighing back all uneaten feed allocated to each treatment group. Birds were daily observed in case of any mortality. Also, during the 30 weeks laying period, number of eggs laid for each treatment group was recorded at regular interval of 11 a.m. every day. Weight of individual egg was measured using a digital top loading scale. Egg diameter was also measured at the mid point using venier caliper. Hen day production was calculated for period of 30 weeks taking note to correct for mortality. Total feed intake during laying period and total egg laid per hen was used to calculate feed needed for a dozen of egg. Also the average cost of producing a kilogram of the layers mash used was used to calculate the cost of feed required by hens to lay a dozen eggs. Feed saved by hens on Skip a Day programmes during rearing over those on *ad libitum* feeding was also calculated and the cost of such savings subsequently derived.

#### *Experimental Design*

The experiment was conducted using a completely randomized design (CRD) as described by (Steel and Torrie, 1980). Data obtained were subjected to analysis of variance (ANOVA). Significant means were separated at  $p < 0.05$  probability level using Duncan's multiple range test (Duncan, 1955).

#### **Results and Discussion**

Feed intake during rearing was significantly reduced ( $p < 0.05$ ) (Table, 2). Expectedly, feed intakes were least among pullets subjected to skip a day (SAD) feeding during rearing. The feed intakes

reduced as duration of feed restriction increased. There was a 10% reduction in total feed consumption when hens were restricted to 60% *ad libitum* controls from 6 to 20 weeks of age (Owings, 1980). Feed intake reduction was also reported by Akinokun *et al.*, (1985) and Oyedeji *et al.*, (2003) when birds were subjected to controlled feeding by way of 70% of *ad libitum* feeding for 8 weeks and skip a day feeding for five weeks during rearing respectively. A cursory look at the feed intake reduction shows that between 1.1 and 2.3 kg of feed per pullet could be saved during rearing. There were differences in feed consumption varying from 4 to 10%, depending upon the level of feed restriction for turkey breeders (Klein Hessling, 1994)).

As shown in table 2, despite the reduction in feed intake, live body weights of hens subjected to SAD for various weeks were still similar to those of full fed pullets ( $p > 0.05$ ). This is contrary to earlier reports. Akinokun, (1985) reported that weights of birds that were fed 70% of *ad libitum* 12 to 20 weeks of age were 7% lower in body weight at housing than their full fed controls. Also, Leeson and Summers, (1985) observed that body weights of broiler breeder pullets raised on a Skip a Day feeding regime were consistently inferior to those of pullets on a daily feed restriction. Pullets on a Skip a Day and Skip two Day feeding regimen required 5 and 11% more feed respectively, than daily restricted pullets in order to reach identical body weights at 22 weeks of age (Cier *et al.*, 1985). The differences observed could be due to the varying degrees of feed restrictions as well as differences in breeds of pullets used.

Table 2: Effects of SAD feeding during rearing on performance indices of hens.

Feeding Regime.	Live body weight at point of lay (kg/hen)	Feed intake (kg/hen)	Feed saved (kg/hen)	Feeding cost saved (N/hen)	Mortality (%)
Full feeding	1.64	5.9 <sup>a</sup>	0.0	0.0 ± 0.0	3.1
SAD 2 weeks	1.56	4.8 <sup>b</sup>	1.1 <sup>d</sup>	54.02 <sup>d</sup>	9.3
SAD 4 weeks	1.48	4.6 <sup>bc</sup>	1.3 <sup>c</sup>	63.09 <sup>c</sup>	0.0
SAD 6 weeks	1.55	4.3 <sup>bc</sup>	1.6 <sup>b</sup>	81.10 <sup>b</sup>	3.1
SAD 8 weeks	1.46	3.6 <sup>c</sup>	2.3 <sup>a</sup>	114.6 <sup>a</sup>	6.3
SEM	0.20	0.5	0.04	4.32	2.9

Means bearing different superscripts in the same column differ significantly ( $p < 0.05$ )

SAD= Skip-a-day

SEM- Standard error mean

During laying, despite the similarity in feed intakes of hens of all groups (Table, 3), body weight of hens previously subjected to SAD feeding for periods ranging from 4 to 8 weeks feeding were similar to those on *ad libitum* feeding ( $p > 0.05$ ). This could be as a result of an attempt by these groups of hens to attain proper body weight for laying. This is in agreement with Leeson, (2001) who stated that for a laying flock to be profitable, hens must attain optimum weight and condition. Also, when considering rate of gain, Klein Hessling (1994) reported that, during the 5 weeks prior to photo stimulation, severely restricted hens had a significant daily rate of gain compared to control hens fed *ad libitum*. Smaller sized pullets resulting from controlled energy intake during

rearing may respond more to elevated nutrients intakes during the laying phase compared with *ad libitum* reared pullets (Lahore and Payne, 1975). As observed in this study, skip a day feeding system did not affect the well being of birds as no mortality was recorded for the 30 weeks during which laying was monitored. This observation is in agreement with that of Oyedeki *et al.*, (2003) who did not report any significant effect of SAD feeding for broilers of mixed sex. It appears that, once water is made available at all times, birds are able to cope with feed restriction as applied in this study. The significant differences in laying performance among all hens in terms of total egg number and Hen Day Production (table, 3) are in contrast with some earlier reports. For example, Akinokun, (1985)

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**Table 3:** Effects of SAD feeding during rearing on the feed intake during laying, final body weight, total egg laid, hen day production (HDP), egg weight, egg diameter, feed intake/dozen egg and feed cost per dozen egg of hens.

Feeding Regime.	Feed intake during laying (kg/hen)	Final body weight (kg/hen)	Total eggs laid/hen	HDP (%)	Egg weight (g)	Egg diameter (cm)	Feed intake /dozen egg laid (kg/hen)	Feed Cost /dozen egg (N)
Full feeding	30.0	1.77	155 <sup>ab</sup>	73.6 <sup>ab</sup>	60.00	4.40	2.4 <sup>b</sup>	122.63 <sup>a</sup>
SAD 2 weeks	28.9	1.73	154 <sup>ab</sup>	73.0 <sup>ab</sup>	57.23	4.31	2.3 <sup>b</sup>	116.86 <sup>a</sup>
SAD 4 weeks	27.4	1.61	143 <sup>b</sup>	68.2 <sup>b</sup>	61.80	4.40	2.3 <sup>b</sup>	118.33 <sup>a</sup>
SAD 6 weeks	26.1	1.70	165 <sup>a</sup>	78.7 <sup>a</sup>	60.91	4.28	1.9 <sup>a</sup>	95.37 <sup>b</sup>
SAD 8 weeks	23.8	1.66	148 <sup>ab</sup>	65.9 <sup>b</sup>	61.02	4.41	1.9 <sup>a</sup>	103.29 <sup>b</sup>
SEM	4.1	0.21	8.0	3.89	2.65	0.01	0.11	8.02

Means bearing different superscripts in the same column differ significantly ( $p < 0.05$ )

SAD- Skip-a-day

SEM- Standard error or mean

reported similar number of eggs laid between the full-fed and restricted hens. Also, Blair, et al., (1976) stated that feed restriction during the rearing period did not affect egg production but feed restriction during laying did. Similarly, Auckland and Wilson (1975) observed that during rehabilitation after feed restriction, egg production was similar for controls and restricted hens. Consistently, hens previously subjected to 6 weeks SAD feeding during rearing laid most in terms of egg number and Hen Day Production and numerically performed better than those on *ad libitum* feeding. This result is also in partial agreement with other earlier reports such as those of Bartov et al., (1988) who reported that restricted hens came into production later and laid at a higher rate during the latter part of the production year. Also, Macintyre and Aittken (1959) calculated the numbers of eggs laid by restricted and full fed hens after correcting

for the delay in sexual maturity and reported that the restricted hens laid more eggs. The present results however differ from that of Ezieshi *et al.*, (2003) who reported that feed restriction depressed egg production, water intake and feed intake although the hens were subjected to feed restriction during laying.

Reports on the effects of feed restriction on egg weights have been inconsistent. While, similar egg weights and egg diameters were recorded among restricted and unrestricted hens in this study (table, 3) in agreement with Akinokun *et al.*, (1985), the result is contrary to that of Gowe *et al.*, (1960) who reported that restricted birds laid heavier eggs than their full-fed controls. However, differing from the present and Gowe *et al.*, (1960) results, Klein-Hessling (1994) reported that feed restriction reduced egg weight. The differences observed may be attributed to the intensity, duration and period at which feed

restriction was employed by various researchers.. Genetic differences of hens used as well as quality of feed could also contribute to the different responses reported.

On feed efficiency measured in terms of feed per dozen egg (table, 3), the results in this study clearly indicated that subjecting hens to either 6 or 8 weeks SAD feeding during rearing improved feed utilization during laying ( $p < 0.05$ ). Body weight differences seen at maturity are usually maintained throughout the laying cycle almost regardless of nutrient profile of layers diets (Leeson, 2001). Body weight at maturity is a major factor influencing feed intake and so, economic performance of laying hens. Larger birds will tend to eat more. The differences in body weights of hens observed at the end of rearing persisted throughout the laying period resulting in higher feed intake by hens fed *ad libitum*. This however did not translate to greater number of eggs laid by this group of hens resulting in poor feed utilization, hence, greater cost per dozen eggs laid. This result is in agreement with that of Macleod and Jewitt (1979) who observed that feed restriction results in improved feed utilization.

The results obtained in this study revealed that subjecting black harco pullets to skip a day feeding for a period ranging from 2-8 weeks during rearing, would reduce feed intake and cost of feeding during rearing with no significant effects on live body weight of hens. Such feeding regimes would also produce similar number of eggs and comparable Hen Day Production during laying with hens fed *ad libitum*. Furthermore subjecting pullets to SAD feeding regimes for either 6 or 8 weeks during rearing could improve feed efficiency in terms of feed per dozen eggs as well as reduce cost per dozen eggs.

Therefore, for optimum result, Skip a Day (SAD) feeding for 6 weeks during rearing for black harco hens as used in this study is recommended.

## References

- Akinokun, O., Benyi K. and Lebbie, S.H.B. 1985.** Effects of controlled feeding before and after 20 weeks of age, on the performance of two strains of hybrid chicken. *Nig. Agric. J.* 19/20: 123-135.
- Auckland, J.N., and Wilson, S.B., 1975.** Restricting energy intake of hens. *Poult. Sci.* 16: 31-35.
- Bartov, I. S., Borenstein, Y., Lev, M. P. and Rosenberg, I. 1988.** Feed restriction in broiler breeder pullets. Skip a day versus skip two days. *Poult Sci.* 67: 809-813.
- Blair, R. 1972.** Feed restriction in breeding birds. *Feedstuffs* Minneapolis, 44: 36-39.
- Blair, R., Mc Cowan, M.M. and Bolton, W. 1976.** Effects of food regulation during the growing and laying stages on the productivity of broiler breeders. *Brit. Poult. Sci.* 17: 215-223.
- Cier, D.Y., Rimisky, N.T.R., Eyal, A., Viola, S. Mayer, H. and Katzir, E. 1985.** Daily feed restriction, Skip a day and skip two days in broiler breeder pullets. Page 29 in Proc. 23<sup>rd</sup> Ann. Conference. Israel Branch World's Poultry Science Association. Zichron Yaacov, Israel.
- Duncan, D.B. 1955.** Multiple range and multiple F tests. *Biometrics*, 11: 1-42
- Ezieshi, V.E., Nwosu, M. J., Suleman, R.O., Ojurongbe, B.C. and Olomu, J.M. 2003.** Laying hen productivity in the Tropics as affected by stage of egg production, feed restriction, stocking density and time of Day. *Arch. Zootec.* 52: 475-482.

- Gowe, R. S., Johnson, A. S., Crawford, F. D., Downs, J. H., Hill, A. T., Mountain, M. F., Felletier, J.R. and Strain, J.H. 1960, Restricted versus full feeding during the growing period for egg production stock. *Brit. Poultr Sci.* 1: 37-56.
- Klein-Hessling, H., 1994. The effect of different levels of physical feed restriction on reproductive performance of commercial large white turkey breeder hens. Ph.D Dissertation. North Carolina State University, Raleigh, NC.
- Lahore, R.M. and Payne C.S., 1975, Effect of nutrition in the growing period on the subsequent performance of crossbred layers. *Austr. J. Exp. Agric. Anim. Husb.* 15, 74, 374-382.
- Leeson, S. 2001, Feeding programmes for laying hens. Technical Bulletin of the American Soybean Association. MITA(P)NO..070/10/2001.
- Leeson, S. and Summers J.D., 1985, Effect of age versus floor rearing and skip a day versus every day feed restriction on performance of dwarf broiler breeders and their offspring. *Poult Sci.* 64, 1742-1749.
- Macintyre, T.M. and Aittken J.R., 1959, The performance of laying hens reared on restricted and full feeding programme. *Can J. Anim. Sci.* 39, 217-225.
- Macleod, M.C. and Jewitt S.G., 1979, Effect of food intake regulation on the energy metabolism of hens and cockerels of a layer strain. *Brit Poult Sci.* 19, 349-363.
- Owings, W. J. and Sell J.L., 1980, Effect of restricted feeding from 6 to 20 weeks of age on reproductive performance of turkeys. *Poultry Science*, 59, 77-81.
- Oyedeji, J.O., Atteh, J.O. and Adedeji, S.A., 2003. Response of Broilers to skip a day (SAD) feeding. *Nig. J. Anim. Prod.*, 30: 2, 163-168.
- Steel, R.G.D. and Torrie J.E., 1980, Principles and procedures of statistics, Biometrical approach, Mc. Graw Hill book Co. Inc. New York, Toronto, London pp. 101-103.
- Yu, M.W., Robinson F.E. and Etches R.J., 1992, Effect of feed allowance during rearing and breeding on female broiler breeders. 2. Ovarian morphology and production. *Poultry Sci.*, 71, 1750-1761.