EFFECTS OF HUMAN MENOPAUSAL GONADOTROPHIN (HMG) ON EGG PRODUCTION OF GUINEA HENS

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ABSTRACT

In a study to investigate the influence of Human Menopausal Gonadotropin (HMG) on egg production of guinea hens, 125 adult hens were randomly allocated to one of 5 doses (0, 6, 12, 18 and 24IU) of HMG administered intramuscularly for 6 weeks over 2 seasons (raining and dry). The effect of HMG was monitored during the period of administration as well as the post administration period. Parameters observed include feed intake, egg number, hen day production (HDP) and egg weight. Data obtained were subjected to analysis of variance appropriate for a 2x2x5 factorial design. Results obtained showed that feed intake was not influenced (P>0.05) by season, administration and doses of HMG. HDP, egg number, egg weight and mass were significantly (P>0.05) influenced by season, administration and doses of HMG. The results suggest that egg production in guinea hens can be improved by HMG administration.

Keywords: HMG, guinea hens, hen day production, egg number.

INTRODUCTION

One major economically important trait in farm animals is reproductive success. Man has therefore embarked on various methods including nutritional, physiological, management, hormonal and many other ways of ensuring high reproductive performance. While reproductive performance is high in some animals it is low in some including the guinea fowl. Since the first experimental induction of super ovulation was reported by Casida *et al* (1943), several commercial preparations of gonadotropins have therefore been used in superovulatory protocols. Recently, natural hormones or their analogue have found special appeal and usage as means of improving the reproductive performances of farm animals (Abu *et al*., 2006). This has become important because of the health concerns of using synthetic hormones. The principal target is to increase both Luteinizing hormone (LH) and follicle stimulating hormone (FSH) secreted by the anterior pituitary gland and which are both essential in reproduction in animals. While the follicle stimulating hormone is involved in the development of tiny follicles, the luteinizing hormone stimulates the production of sex steroids in the ovarian follicles. One such derivative is Human Menopausal Gonadotropin, HMG.

Pergonal® has been reported to induce ovulation in domestic animals (Sugano *et al.*, 2001;). Iheukwuemere *et al.* (2006) reported its usage in the Nigerian indigenous chickens to improve semen production. Guinea fowls are seasonal egg producers and lay only few eggs each season. Efforts to improve their egg laying capacity through the usage of safe, natural and non-abusive source of hormonal preparations would therefore be advantageous. The study was therefore carried out to investigate the influence of HMG on egg production of the guinea hen.

MATERIALS AND METHODS

A total of 125 thirty-six weeks old guinea hens were used for the experiment; each treatment (dose of HMG) was replicated five times, with five birds per replicate. The birds were randomly allocated to five treatment groups (doses) covering two seasons (dry and raining seasons) and two efficacy periods (period of HMG administration and post administration period) in a 2 x 2 x 5 factorial design. The treatment groups are:

i. 24.0 IU (0.32ml) of HMG per bird
ii. 18.0 IU (0.24ml) of HMG per bird
iii. 12.0 IU (0.16ml) of HMG per bird

iv. 6.0 IU (0.08ml) of HMG per bird
v. ml of physiological saline solution (control).

The HMG (IVF-M $_{Inj}$) was administered intramuscularly on three consecutive days per week (Monday to Wednesday) for six weeks during the dry season (December/January) following which the withdrawal effect was monitored over four months. The administration was repeated for six weeks during the rainy season (May/June) and the withdrawal effect also monitored over a period of four months. Birds were housed in battery cages and fed diet containing 20% crude protein and 2750kcal/kg metabolizable energy. Feed and water were supplied *ad libitum* throughout the experimental period which lasted 11 months. Data collected during the experimental period include feed intake, egg number, hen day production, egg weight and egg mass. All data obtained were subjected to analysis of variance (ANOVA) appropriate for a 2 x 5 factorial using Genstat Discovery Edition 4. Differences in means were separated using Duncan multiple range test of the same statistical package.

RESULTS AND DISCUSSION

Feed intake was not (P>0.05) influenced by season, administration and doses of HMG as the birds were probably on identical physiological status and thus feed requirements were similar (Table 1). There were no significant interactions (P>0.05) between season, administration and doses of HMG. Hen day production was significantly influenced (P<0.05) by season, administration and dose of HMG. Hen day production in the rainy season was higher (P<0.05) than in the dry season which agrees with the report of other authors that egg production is better in the rainy season than in the dry season. There was significant interaction (P<0.05) between season and efficacy period of HMG on HDP. The range of hen day production obtained in the administration period of rainy season was higher than other periods (26.33 – 41.43%) and is higher than the 9.51 – 13.44 % reported by Dudusola (2010) for the pearl strain of guinea fowl fed varying levels of dietary protein and energy than the 14.99 – 21.68% reported by Oke *et al.* (2003) for helmeted guinea fowls. The values agree with the 20 to 40% for pearl hens aged 32 to 72 weeks reported by Nahashon *et al.* (2006). Irrespective of the doses of HMG administered, HDP was lowest (P<0.05) during the administration period in the dry season. The significantly different HDP as a result of HMG in this study is contrary to the reports of Adeyina *et al.* (2011) who reported no significant influence of HMG (Pergonal®) administered at doses of 0, 2 and 4 IU on hen day production of Japanese quails. Egg number was significantly (P<0.05) influenced by season, efficacy period of HMG and the dose administered. Egg number was significantly higher in the post administration period in this study and this might be as a result of the time interval required for the exogenous hormone to take effect. It appears therefore that constant or at least periodic administration of HMG might be required to sustain egg production in the guinea fowl. The doses of the HMG administered did not result in significant increase in egg number over the Control and there was no particular trend in the groups administered HMG. The egg number obtained in this study was significantly higher in the rainy than dry season. This is in line with previous reports (Adeyinka *et al.*, 2007; Jesuyon and Salako, 2013) that more eggs are produced in the rainy season. This they attributed to either abundance of feed in the wild during the rainy season or a more conducive environmental and hormonal factor. Egg weights obtained in this study revealed the effect (P<0.05) of season, administration and doses of HMG. Previous authors have reported significant influence of season on egg weight in chickens (Adedeji *et al.*, 2006 and Enaint *et al.*, 2009) and in guinea fowl (Ayorinde *et al.*, 1989). There was improvement in egg weight through administering HMG up to a dose of 18 IU. This is contrary to the findings of Christian and Williams (1999) and Williams (1999) who reported no increase in egg size when exogenous estradiol was administered. Egg weights obtained in this study, 32.90g and 38.41g, are similar to earlier reports (Nahashon *et al.*, 2006; Obike *et al.*, 2011). Egg mass was similar (P>0.05) in the two seasons but administration of HMG and the different doses significantly (P<0.05) influenced egg mass. Egg mass was similar for both seasons but higher in the post administration period than in the administration period. Highest egg masses were recorded during the post administration period of the rainy season.

CONCLUSION

Egg production in the guinea hen especially in the dry season can be improved with periodic administration of HMG.

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Table 1: Effect of Season, Efficacy Period and Dose of HMG on Performance of Guinea Hens

Traits	Feed Intake (g/b/d)	HDP (%)	Egg Number	Egg Weight (g)	Egg Mass (g)
Season					
Dry Season	80.46	18.91^b	1.33^b	35.08^b	711.43
Rainy Season	79.57	28.27^a	1.98^a	36.81^a	611.66
SEM	0.49	0.97	0.07	0.22	19.4
Efficacy Period					
HMG Administration	80.36	19.18^b	1.34^b	35.59^b	303.84^b
Post-HMG Administration	79.70	28.00^a	1.97^a	36.36^a	1019.25^a
SEM	0.33	1.47	0.1	0.2	50.4
Dose					
0 IU	78.79	28.04^a	1.96^a	34.84^d	752.39^a
6 IU	79.93	22.22^a	1.56^b	35.06^{cd}	626.22^{ab}
12 IU	80.92	25.52^a	1.79^a	36.67^b	736.97^a
18 IU	80.18	14.70^b	1.05^c	37.68^a	406.44^b
24 IU	80.49	27.46^a	1.92^a	36.06^{bc}	785.71^a
SEM	0.57	3.17	0.22	0.4	97.6
Season x Efficacy Period	NS	*	*	*	*
Season x Dose	NS	NS	NS	NS	NS
Efficacy Period x Dose	NS	NS	NS	NS	NS
Season x Efficacy Period x Dose	NS	NS	NS	NS	NS

Means along each column followed by different superscripts differ significantly (P<0.05)