COMPARISON OF EGG PARAMETERS BETWEEN ISA BROWN AND HARCO BLACK LAYERS FED DIFFERENT LEVELS OF DIETARY ACETYLSALICYLIC ACID

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ABSTRACT
This study was carried out to investigate the egg parameters of layers fed different levels of Acetylsalicylic Acid (ASA). One hundred and ninety-two layers comprising 96 Harco Black and 96 Isa Brown breeds were assigned to four different treatment diets with levels of aspirin at 0.00%, 0.025%, 0.050% and 0.075% for diet 1(D1), diet 2 (D2), diet 3 (D3) and diet 4 (D4) respectively. Diet 1 with no inclusion of ASA served as the control. The birds in each treatment were replicated four times with 12 birds per replicate. All the birds were fed with these diets for 16 weeks. The data on body weight change, egg weight, mortality, egg mass index, hen-day and hen-housed production were recorded. The results showed that the final weight differed significantly between the two breeds and among the four treatment diets. The Isa Brown (IB) breed was heavier (1614.12±20.93g) than the Harco Black (HB) breed (1493.63±24.13g). The final weight of the birds increased with increase in the inclusion of ASA from 1481.25±50.13g in D1 to 1589.77±40.58g.in D4. The two breeds of the birds also differed significantly in terms of percentage mortality. The HB breed recorded 8.20% mortality while 4.30% was recorded for the IB breed. The egg mass index improved with the inclusion of ASA in the diets. Egg weight was heavier (57.66g) in HB than in IB (56.64g) while the administration of ASA improved the hen-day production from 67.39% in D1 to 72.85% in D3. The hen-day production was better improved in HB breed with dietary inclusion of ASA than in the IB breed. Better improvement in hen-housed production in HB was also recorded with dietary ASA which increased from 59.28% in D1 to 64.99% in D4 while it slid from 73.56% in D1 to 54.99% in D4 in the IB breed. In conclusion, the inclusion of ASA in the diets of laying chickens could be beneficial in terms of reduction of mortality rates and improvement of egg production parameters like egg mass index, percentage hen-day and hen-housed production.
Keywords: Egg parameters, layers, livability, Harco Black, Isa Brown.

INTRODUCTION
Over the past three decades drugs have been used increasingly in the rearing of animals for human consumption for increasing the productivity of livestock. Some of these drugs are directed towards improving the feed efficiency while some have been so constituted to potentiate the gut microbiota towards ensuring a favourable gut health. Some are however administered to combat heat stress and hence help to strike a balance the external and internal milieu of the animals. Some of these therapeutic agents that are used to reduce the harmful effects of heat stress on livestock include ascorbic acid (Cier *et al.*, 1992), sodium chloride (Aro *et al.*, 2015), potassium chloride (Ahmad *et al.*, 2008) and acetyl salicylic acid (Oluyemi and Adebanjo, 1979).

Acetylsalicylic acid (ASA) is the chemical name for a member of the salicylate drugs commonly known as Aspirin. This drug has been shown to have conflicting effects of farm animals following its administration through diverse routes. For instance, Balog and Hester (1991) reported that feeding 0.05% ASA to aged layer breeders for a period of four weeks reduced production of shell-less eggs. Also Oluyemi and Adebanjo (1979) reported that feeding ASA to hens during heat stress conditions improved egg quality and production. Urick and Johnson (2006) reported that aspirin treated hens showed tendency for inhibition of progression of ovarian cancer and egg production. On the other hand, McDaniel *et al.* (1979) found no improvement in egg production or feed efficiency after chronic feeding aspirin added diet. They also found decreased hen livability and eggshell quality in

the aspirin fed chickens. As a result of the somewhat conflict reports on the use of ASA, this experiment was therefore conducted to further elucidate the effects of ASA on laying hens by focusing on the performance and egg characteristics Isa Brown and Harco Black as response criteria.

MATERIALS AND METHODS

This experiment was carried out at the Livestock Section of Teaching and Research Farm of the Federal University of Technology Akure, Ondo State, Nigeria. One hundred and ninety-two point of lay birds comprising 96 Harco Black and 96 Isa Brown wee used for the experiment. Four experimental diets were formulated to meet the nutrient requirement of layers, while Aspirin the test ingredient was varied at 0.00%, 0.025%, 0.050%, and 0.075% of the diet respectively. The 0.00% diet (D1) served as the control while the other three diets were assigned D2, D3, and D4 respectively. Each treatment consisted of four replicates which included the two breeds of birds (12 birds per replicate and 48 birds per treatment). The experiment was carried out over a period of 16 weeks. The hens were fed with the experimental diets until the end of the experiment. All experimental data were recorded from the beginning of lay and was continued for 16 weeks of lay. Table 1 gives the composition of the experimental diets.

Medication and vaccination were administered to maintain the health of the birds throughout the period of the study. All birds in each treatment were weighed at the beginning (initial live body weight) and at the end of experimental period (final live body weight) to calculate body weight change or increase in body weight. Birds were served feed and water at 8 o'clock in the morning; the drinkers and feeders were constantly refilled throughout the day while the remnant feed was weighed back at 6 o'clock in the evening. Mortality was also recorded and noted. Data were collected on initial and final body weights egg mass index, egg weight, hen-day production and hen-housed production.

Data Analysis: Data were analyzed as a two-way factorial analysis of four aspirin levels (0.00%, 0.025%, 0.050% and 0.075% versus two breeds of layers (Harco Black and Isa Brown) i.e. a 2x4 factorial analysis. Data collected were subjected to statistical analysis using SAS (2008) software package. Significant differences between treatment means were separated using Duncan's multiple range tests. Significant differences were accepted at $p<0.05$.

RESULTS AND DISCUSSION

Table 2 shows the performance and egg characteristics of the experimental birds fed different levels of inclusion of ASA. The final weight differed significantly between the two breeds and among the four treatment diets. The Isa Brown (IB) breed was heavier (1614.12±20.93g) than the Harco Black (HB) breed (1493.63±24.13g). The final weight of the birds increased with increase in the inclusion of ASA from 1481.25±50.13g, in D1 to 1589.77±40.58g.in D4. The interaction between breed and the inclusion level of ASA showed that The IB breed responded better to ASA than the HB breed as far as the final weight of the birds is concerned. The body weight change of the birds during egg laying followed the same trend as the final weight. The weight change that improved with dietary inclusion of ASA showed its ameliorative effect on the birds during periods of heat stress without loss of body conditions such as decreased body weight (Lecui *et al.*, 1998).

The two breeds of the birds also differed significantly in terms of livability. The percentage mortality of HB in the course of the experiment was 8.20 while 4.30 was recorded for the IB breed. The effect of ASA on livability of the birds did not however follow a well defined trend, This supports the opinion of Urick *et al.* (2009) that dietary aspirin had no beneficial effect on sudden death syndrome in livestock. However, the inclusion of 0.050% ASA seemed to confer the best livability on the birds with the IB showing a better response (0.00%) than the HB (4.92%) breed at this inclusion level. The egg mass index showed an observable breed difference in favour of the IB breed and also on the interaction between breeds and ASA levels. It was also observed that the inclusion of ASA in the diets improved the egg mass index. The HB had a heavier egg weight at the level of breed, dietary treatment and interactions between breeds and dietary treatments. There were no significant differences in both the hen-day and hen-housed production between the IB and HB breed, however the administration of ASA

improved the hen-day production from 67.39% in D1 to 72.85% in D3. The HB breed had a better improvement in hen-day production than the IB with increase in the inclusion of ASA in the diets. The hen-housed production in HB also got improved with dietary ASA from 59.28% in D1 to 64.99% in D4 better than IB that slid from 73.56% in D1 to 54.99% in D4

CONCLUSION

This experiment showed that the IB is the heavier of the two breeds of commercial layers with a lower mortality rate and higher egg mass index. The lower mortality rate thus conferred a better livability on the IB breed. Also livability was further enhanced in the IB than in the HB breed. The inclusion of ASA in the diets improved the egg mass index. The HB however had heavier egg weight and better hen-day production while its hen-housed production was drastically improved by the inclusion of ASA in the diets. Conclusively, the inclusion of ASA in the diets of laying chickens could be beneficial in terms of reduction of mortality rates and improvement of egg production parameters like egg mass index, percentage hen-day and hen-housed production.

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Table 1: Gross composition (g/100 g) of the experimental diets

Ingredients	D1	D2	D3	D4
Maize	45.00	45.00	45.00	45.00
Soybean meal	12.00	12.00	12.00	12.00
Wheat offal	22.00	21.98	21.96	21.94
Palm kernel cake	3.50	3.50	3.50	3.50
Groundnut cake	6.50	6.50	6.50	6.50
Fish meal	1.00	1.00	1.00	1.00
Bone meal	2.60	2.60	2.60	2.60
Limestone	6.50	6.50	6.50	6.50
Methionine	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10
Layers' premix	0.25	0.25	0.25	0.25
Salt	0.30	0.30	0.30	0.30
ASA	0.00	0.025	0.050	0.075
Total	**100.00**	**100.00**	**100.00**	**100.00**
Calculated:				
Crude protein	16.70	16.70	16.70	16.70
ME (Kcal/kg)	2508	2508	2508	2508
Crude fbre	4.48	4.48	4.48	4.48
Calcium	3.32	3.32	3.32	3.32
Phosphorus	0.94	0.94	0.94	0.94

D1 = Diets with 0.00% aspirin; D2 = Diets with 0.025% aspirin; D3 =Diets with 0.050% aspirin and D4 =Diets with 0.075% aspirin.

Table 2: Performance parameters of Harco Black and Isa Brown layers fed different levels of ASA

SOV	Breeds	IW (g)	FW (g)	WG (g)	Mort. (%)	EMI	EW (g)	HDP (%)	HHP (%)
	Harco Black	770.83	1493.63^{b}	722.80^{b}	8.20^{a}	31.84^{b}	57.55^{a}	71.01	59.46
	Isa Brown	807.29	1614.12^{a}	806.83^{a}	4.30^{b}	32.74^{a}	56.64^{b}	66.78	58.92
±SEM (Breed)		18.33	23.45	34.78	2.67	0.43	0.57	16.15	16.15
0.00% ASA		808.33	1481.25^{b}	672.92^{b}	5.74^{a}	32.27^{a}	58.12^{a}	67.39^{c}	66.42^{a}
0.025% ASA		793.75	1565.40^{ab}	771.65^{a}	8.20^{a}	32.68^{a}	55.87^{c}	64.99^{c}	55.71^{b}
0.050% ASA		772.92	1579.07^{a}	806.16^{a}	2.46^{b}	31.98^{b}	57.09^{b}	72.85^{a}	54.63^{c}
0.075% ASA		781.25	1589.77^{a}	808.52^{a}	8.61^{a}	32.24^{a}	57.30^{a}	70.35^{b}	59.99^{b}
±SEM (Levels of ASA)		25.67	43.44	56.77	4.89	0.55	0.68	15.22	17.08
0.00% ASA	Harco Black	812.50	1405.83^{d}	593.33^{c}	7.38^{a}	32.20^{b}	58.96^{a}	61.21^{b}	59.28^{c}
0.00% ASA	Isa Brown	804.17	1556.67^{b}	752.50^{b}	4.10^{b}	32.34^{b}	57.28^{b}	73.57^{ab}	73.56^{a}
0.025% ASA	Harco Black	741.67	1514.90^{c}	773.23^{b}	13.11^{a}	32.15^{b}	55.91^{c}	66.42^{b}	54.28^{c}
0.025% ASA	Isa Brown	845.83	1615.91^{a}	770.08^{b}	3.28^{b}	33.21^{a}	55.83^{c}	63.57^{b}	57.14^{b}
0.050% ASA	Harco Black	754.17	1524.81^{c}	770.64^{b}	4.92^{b}	30.74^{c}	56.44^{c}	79.28^{a}	59.28^{c}
0.050% ASA	Isa Brown	791.67	1633.33^{a}	841.67^{a}	0.00^{c}	33.21^{a}	57.73^{b}	66.42^{b}	49.99^{c}
0.075% ASA	Harco Black	775.00	1528.98^{c}	753.98^{b}	7.38^{a}	32.26^{b}	58.89^{a}	77.14^{a}	64.99^{b}
0.075% ASA	Isa Brown	787.50	1650.57^{a}	863.07^{a}	9.84^{a}	32.22^{b}	55.72^{c}	63.56^{b}	54.99^{c}
±SEM (Breed*ASA)		45.33	30.86	56.08	3.25	0.88	1.13	8.53	5.01
Breeds			1.40ns	0.03sig	0.04sig	0.04sig	0.03sig	0.03sig	0.50ns
ASA levels		0.25ns	0.02sig	0.04sig	0.04sig	0.04sig	0.04sig	0.03sig	0.04s
Breed*ASA		0.63ns	0.03sig	0.03sis	0.04sig	0.03sig	0.03sig	0.04sig	0.03sig

a, ab, b, c, d = Means on the same column but with different superscripts are statistically (P<0.05) significant

SOV = Source of variation; ASA = Acetyl salicylic acid; IW = Initial weight; FW = Final weight; WG = Weight gain; Mort. = Mortality; EMI = Egg mass index; EW = Egg weight; HDP = Hen-day production; HHP = Hen-housed production; ns = not significant; sig = significant.