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Dietary supplementation of acetylsalicylic acid improved growth, livability and egg production performance in two breeds of commercial layers

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Abstract

Heat stress is a silent threat to the well-being of chickens with negative impacts on their health, performance and productivity in the tropics. This has therefore, necessitated its control among the flocks of poultry. Acetylsalicylic acid (ASA) is commonly used to improve the performance and well-being of birds under heat stress but its effects on the production performance of Isa brown (IB) and Harco black (HB) breeds are yet to be examined. This study was therefore, conducted to unravel the effect of ASA on these birds' performance. One hundred and ninety-two birds comprising 96 IB and 96 HB layers were randomly allotted to four treatment diets supplemented with 0, 0.025, 0.050 and 0.075% of ASA at 48 birds/treatment in four replicates of 12 birds each. Feed intake, weight change, mortality, hen-day egg production (HDEP) and hen-housed egg production (HHEP) were determined. Results showed that IB recorded a higher weight change (806.83±33.45g) than the HB (722.8±35.91g) breed. Dietary ASA supplementation at 0.075% produced the highest weight change (808.52±242.73g) relative to the control (672.92±65.04g). The ASA level at 0.050% produced the lowest mortality (2.46±0.01%). Conclusively, the use of ASA in the diets improved weight change in the birds. The IB breed had a better livability (95.70%) than the HB breed (91.80%). The ASA at 0.050% conferred the best livability (97.54%) on the birds. Also, the use of ASA significantly improved total egg production. The ASA supplementation had a better ameliorative effect on HB than the IB breed.

Keywords: Acetylsalicylic acid, layers, livability, performance.

Introduction

The world is currently groaning under the heavy impact of climate change with its negative consequences on the health and wellbeing of man and his livestock. Heat stress has been identified as the most ubiquitous environmental stressor militating against the intensive livestock production industry in the tropics. It is known to hamper the functionalities of the immune system with a concomitant reduction in livestock performance (Salvic, *et al.,*1993; Maini, *et al.*, 2007; Leo, 2013). Heat stress has also been implicated in the reduction in livestock body weight (Lecui, *et al.,* 1998), egg production (Daghir, 2008) and increased mortality (Ridell, 1997). Different approaches have been employed to mitigate the harmful effects of heat stress on the performance of poultry namely,the use of ascorbic acid (Cier, *et al.*,1992), sodium chloride (Smith, 1994), sodium bicarbonate (Branton, *et al.,* 1986), carbonated drinking water (Koelkebeck, *et al.,*1992), potassium chloride (Ahmad, *et al.,* 2008) and acetylsalicylic acid (Stilborn, *et al.,*1988; Aro, *et al.*, 2017). Acetylsalicylic acid (ASA) i.e. Aspirin, works as a blood thinner and acts as an analgesic, anti-inflammatory as well as an anti-pyretic agent (Aro, *et al.*, 2017). It has also been reported to significantly reduce faecal moisture content thus highlighting its potential to mitigate poultry wet litter and thus contributing to the reduction of the negative impact of climate change (Aro, *et al.,* 2018).The poultry birds are among the most vulnerable livestock species when it comes to exposure to heat stress. This is even more so with the laying hens that spend their productive cycle of about 72 weeks under the direct onslaught of heat stress in tropical climates. The use of ASA as an antidote of heat stress would therefore be most beneficial to laying hens' welfare and productivity judging from the potential attributes of ASA. The foregoing attributes of ASA has thus necessitated this experiment to investigate the effects of feeding ASA supplemented diets to two commercial breed of layers from the pre-lay stage of production till the 32nd week of age.

Materials and methods

Experimental site

The experiment was carried out at the Teaching and Research Farm (poultry unit) of the Federal University of Technology Akure, Nigeria. The farm is located in the equatorial climatic zone of Western Nigeria, characterized by two rainfall peaks, high temperature and high humidity especially during the rainy season. The mean annual rainfall is about 1,500mm and last for 9 months usually from March to November every year. It also has a mean annual temperature of about 27^{o}C and relative humidity of over 75%.

Experimental animals and their management

One hundred and ninety-two (192) growing hens comprising 96 Harco black (HB) and 96 Isa brown (IB) at 9 weeks of age, with an average live weight of 850g were used. The birds were initially fed standard growers' diet still their point of lay after which they were switched to a standard layers' diet. Both the growers and layers diets were supplemented 0, 0.025, 0.050 and 0.075% of acetylsalicylic acid (ASA) respectively. Tables 1 and 2 below show the gross composition of both the growers and layers diets.

Table 1: Gross composition (g/100g) of growers'/pullets' diets

Ingredients	T1	T2	T3	T4
Maize	52.00	52.00	52.00	52.00
Vegetable oil	2.50	2.50	2.50	2.50
Fish meal	2.00	2.00	2.00	2.00
SBM	10.00	10.00	10.00	10.00
GNC	18.75	18.75	18.75	18.75
PKC	10.00	10.00	10.00	10.00
Bone meal	3.00	3.00	3.00	3.00
Limestone	1.00	1.00	1.00	1.00
Methionine	0.15	0.15	0.15	0.15
Lysine	0.10	0.10	0.10	0.10
Salt	0.25	0.25	0.25	0.25
Growers' premix	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**
ASA	-	0.025	0.050	0.075
Crude protein	20.41	20.41	20.41	20.41
ME (Kcal/kg)	2710.92	2710.92	2710.92	2710.92

T1= Control diet with 0% ASA; T2= Diet with 0.025% ASA; T3= Diet with 0.050% ASA; T4= Diet with 0.075% ASA; ASA = Acetylsalicylic acid; ME = Metabolizable Energy.

Table 2: Gross composition (g/100g) of the layers' diets

Ingredients	T1	T2	T3	T4
Maize	50.00	50.00	50.00	50.00
Soybean meal	12.00	12.00	12.00	12.00
Wheat offal	17.00	17.00	17.00	17.00
Groundnut cake	6.50	6.50	6.50	6.50
Palm kernel cake	3.50	3.50	3.50	3.50
Fishmeal	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
Layer's premix	0.25	0.25	0.25	0.25
Salt	0.30	0.30	0.30	0.30
Total	**100.00**	**100.00**	**100.00**	**100.00**
ASA	0.00	0.025	0.050	0.075
Calculated content				
Crude protein (%)	16.70	16.70	16.70	16.70
ME ($MJkg^{-1}$)	10.50	10.50	10.50	10.50
Crude fibre (%)	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

Nutrient Composition of Layer's premix includes (Vitamin Premix): Antioxidant (125,000mg), Folic Acid (500mg), Niacin (15,000mg), Calpan (5000mg), Biotin (20mg), Vitamin A (10,000,000I.U), B1 (1,500mg), B2 (500mg), B6 (1,500mg), B12 (10mg), D3 (2,200,000I.U), E (10,000mg), and K3 (2,000mg). Mineral premix includes: Selenium (200mg), Iodine (1,000mg), Iron (40,000mg), Cobalt (200mg), Manganese (70,000mg), Copper (4,000mg), Zinc (50,000mg) an d Choline Chloride (150,000mg). T1= Control diet with 0% ASA; T2= Di et with 0.025% ASA; T3= Diet with 0.050% ASA; T4= Diet with 0.075% ASA; ASA = Acetylsalicylic acid; ME = Metabolizable Energy.

Experimental layout and feeding trial

The birds were randomly allotted into four treatments each of which contained 48 birds, replicated four times at 12 birds per replicate comprising six IB and HB breeds each. The growers' phase of the experiment lasted for eight weeks that marked the start of lay while the layers' phase continued for 16 weeks at the attainment of 32 weeks of age. This study was thus conducted to unravel the effect of ASA on these birds' performance at growers' stage to point of lay at the 16^{th} week of age, while egg production was monitored up to the 32^{nd} week of age.

Data collection

Initial and final body weights of the birds were determined at the beginning and end of the study respectively. Daily feed intake was recorded throughout the duration of the experiment. Mortality in the birds was checked and recorded daily. Total egg production, hen-day egg production (HDEP), hen-housed egg production (HHEP) and egg weight were also determined.

Experimental design and statistical analysis

Data on performance of the layers at different ASA supplementation levels were subjected to 2 x 4 factorial arrangements in a completely randomized design (CRD) using SPSS (2016), Version 18 statistical package. The Duncan Multiple range test of the same statistical package was used to separate the mean differences among treatments where significant differences were found.

Results

Weight change and livability parameters between 9th and16th week of age of Isa brown and Harco black pullets fed different levels of acetylsalicylic acid (ASA).

The result of weight change and livability parameters between the 9th and 16th week of age of Isa brown (IB) and Harco black (HB) pullets fed different levels of ASA is presented in Table 3. The result showed significant differences ($p<0.05$) in the final weight and weight change of the birds. The IB had a significantly higher final weight and weight change of 1614.12±20.93g and 806.83±33.45g respectively while the HB had a lower final weight of 1493.63±24.13g and weight change of 722.8±35.91g.

Table 3: Weight change and livability parameters between the 9 th and 16th week of age in Isa brown and Harco black pullets fed dietary supplementation of acetylsalicylic acid.

Treatments	Breeds	Initial weight (g)	Final weight (g)	Weight change (g)	Mortality (%)	Livability (%)
	IB	807.29±21.21	1614.12±20.93^{a}	806.83±33.45^{a}	4.30±2.44^{b}	95.70±2.44^{a}
	HB	770.83±16.44	1493.63±24.13^{b}	722.8±35.91^{b}	8.20±0.28^{a}	91.80±0.28^{b}
0.00% ASA		808.33±39.23	1481.25±50.13^{b}	672.92±65.04^{c}	5.74±0.50^{b}	94.26±0.50^{b}
0.025% ASA		793.75±40.88	1565.4±43.59^{ab}	771.65±52.04^{b}	8.20±0.62^{a}	91.80±0.62^{c}
0.050% ASA		772.92±13.77	1579.07±33.15^{a}	806.16±28.08^{a}	2.46±0.01^{c}	97.54±0.01^{a}
0.075% ASA		781.25±12.90	1589.77±40.58^{a}	808.52±42.73^{a}	8.61±0.23^{a}	91.39±0.23^{c}
Breed × Treatment						
0.00% ASA×IB		804.17±95.83	1556.67±1.67^{c}	752.5±97.50^{b}	4.10±0.07^{e}	95.90±0.07^{b}
0.00% ASA×HB		812.50±4.17	1405.83±60.83^{d}	593.33±56.67^{c}	7.38±0.75^{c}	92.62±0.75^{d}
0.025% ASA×IB		845.83±12.50	1615.91±75.00^{a}	770.08±87.5^{b}	3.28±0.05^{e}	96.72±0.05^{b}
0.025% ASA×HB		741.67±66.67	1514.9±26.01^{c}	773.23±92.68^{b}	13.11±1.20^{a}	86.89±1.20^{f}
0.050% ASA×IB		791.67±16.67	1633.33±16.67^{a}	841.67±33.33^{a}	0.00±0.00^{f}	100±0.00^{a}
0.050% ASA×HB		754.17±12.50	1524.81±20.64^{c}	770.64±33.14^{b}	4.92±0.09^{d}	95.08±0.09^{c}
0.075% ASA×IB		787.5±29.17	1650.57±36.93^{a}	863.07±66.10^{a}	9.84±0.15^{b}	90.16±0.15^{e}
0.075% ASA×HB		775.00±8.33	1528.98±33.52^{c}	753.98±25.19^{b}	7.38±0.23^{c}	92.62±0.23^{d}
Breed		NS	*	*	*	*
Treatment		NS	*	*	*	*
Breed×Treatment		NS	*	*	*	*

*a,ab,b,c,d,,e f = Means on the same column, within the same subclass but with different superscripts are statistically significant (p<0.05); NS = not significant; * = significant; IB = Isa brown; HB = Harco black; ASA = Acetylsalicylic acid*

The ASA treatment significantly ($p<0.05$) influenced the body weight as evidenced in the weight change in the course of the experiment. Birds that were fed the diet containing 0.075% ASA recorded the highest weight change (808.52 ± 42.73g) while the least weight change (672.92± 65.04g) was recorded in birds that were fed the control diet. There were significant differences in the interaction between breeds and the levels of ASA supplementation in terms of weight change. The highest weight change (863.07±66.10g) was recorded in the IB birds fed the diet containing 0.075% ASA while the HB birds fed 0.025% ASA diet recorded the highest (773.23±92.68g) weight change. Significant breed differences were observed in mortality between the IB and HB breeds (4.30±2.44% and 8.20±0.28% respectively); hence IB had better livability (95.70%) than HB (91.80%). Dietary supplementation of ASA was most beneficial at reducing mortality (2.46±0.0%) and hence improving livability (97.54%) at 0.050%. Interaction between breed and the ASA levels had significant ($p<0.05$) effects on mortality. The lowest mortality was recorded in both breeds (0.00±0.00% for IB and 4.92±0.09% for HB) when the diets were supplemented with 0.050% ASA with corresponding livability of 100% and 95.08% respectively. There was no significant (p>0.05) breed difference in feed intake. The least value of feed consumption (638.92±26.53g) was observed at 0.050% dietary ASA treatment while the values recorded for the other ASA levels (i.e. 0.025% and 0.075% ASA) were found to be statistically the same. The interaction between the breeds and the ASA levels produced significant effects on feed intake which did not follow a clear-cut trend. For HB, the highest feed intake (720.37±38.63g) was observed in the diet containing 0.025% ASA while the least (628.12±36.67g) was obtained from HB birds that were fed 0.050% ASA diet.

Egg performance parameters at 32nd week of age of Isa brown and Harco black layers fed dietary supplementation of acetylsalicylic acid (ASA).

Table 4 shows the results of egg performance parameters at the 32nd week of age of Isa brown (IB) and Harco black (HB) layers fed dietary supplementation of acetylsalicylic acid. There were no significant (p>0.05) breed effects but significant treatment effects were observed in the feed intake and total egg production.

Table 4: Feed intake and egg performance parameters at 32nd week of age of Isa brown and Harco black fed different levels of acetylsalicylic acid

Treatment	Breed	Feed Intake (kg)/bird	Total Egg Production/ bird	Egg weight (g)	Hen-Day Production (%)	Hen-Housed Production (%)	FCR (kg of feed/kg of egg)
	IB	12.34±1.13	116.22±5.40	56.64±0.55^{b}	66.78±13.00	58.92±38.00	1.88±0.02
	HB	12.64±3.25	118.03±5.03	57.55±0.60^{a}	71.01±38.00	59.46±13.00	1.86±0.02
0.00%ASA		12.63±3.56^{a}	103.00±9.36^{c}	58.12±0.85^{a}	67.39±12.00	66.42±5.00^{b}	2.11±0.19^{a}
0.025%ASA		12.82±4.42^{a}	123.38±4.95^{a}	55.87±0.76^{b}	64.99±9.75	55.71±25.00^{c}	1.86±0.09^{b}
0.050%ASA		11.93±4.43^{b}	117.50±5.03^{b}	57.09±0.81^{a}	72.85±10.23	71.80±7.50^{a}	1.78±0.01^{c}
0.075%ASA		12.64±2.01^{a}	124.38±5.78^{a}	57.30±0.82^{a}	70.35±25.00	59.99±5.00^{c}	1.77±0.01^{c}
Breed×Treatment							
0.00% ASA×IB		12.68±1.67^{ab}	108.75±8.75^{c}	57.28±1.20^{b}	73.57±12.50^{a}	73.56±5.02^{a}	2.04±0.13^{ab}
0.00% ASA×HB		12.59±8.58^{ab}	97.75±8.50^{d}	58.96±1.20^{a}	61.21±9.23^{b}	59.28±5.10^{c}	2.19±0.17^{a}
0.025% ASA×IB		12.20±3.68^{ab}	125.50±6.75^{b}	55.83±0.86^{c}	63.57±8.46^{b}	57.14±3.78^{b}	1.74±0.15^{d}
0.025% ASA×HB		13.45±6.44^{a}	121.75±25.00^{b}	55.91±1.29^{c}	66.42±5.67^{b}	54.28±5.03^{c}	1.98±0.08^{b}
0.050% ASA×IB		12.05±0.04^{ab}	113.13±8.13^{c}	57.73±1.07^{b}	66.42±5.98^{b}	66.42±5.98^{b}	1.85±0.10^{c}
0.050% ASA×HB		11.72±6.11^{b}	121.88±27.50^{b}	56.44±1.23^{c}	79.28±9.10^{a}	59.28±5.21^{a}	1.70±0.10^{d}
0.075% ASA×IB		12.44±1.12^{ab}	117.50±40.00^{c}	55.72±1.22^{c}	63.56±5.20^{b}	54.99±5.13^{c}	1.90±0.08^{bc}
0.075% ASA×HB		12.85±4.25^{ab}	131.25±10.00^{a}	58.89±1.02^{a}	77.14±10.11^{a}	64.99±5.67^{b}	1.66±0.08^{d}
Breed		NS	NS	*	NS	NS	NS
Treatment		*	*	*	NS	*	*
B×T		*	*	*	*	*	*

*a,ab,b,bc,c,d = Means on the same column within the same subclass but with different superscripts are statistically significant (p<0.05); NS = not significant; * = significant; IB = Isa brown; HB = Harco black; ASA = Acetyl salicylic acid; B x T = Breed x Treatment.*

The birds fed 0.075% dietary ASA were found to produce the highest number of eggs (124.38±5.78 eggs) just as the least number of eggs (103.00±9.36eggs) was recorded in birds that were raised on the control diet (0.00% ASA). Significant differences were observed in the total egg production in the interaction between breeds and ASA levels. For HB, the highest total egg production (131.25±10.00 eggs) was observed in the birds that were raised on 0.075% ASA diet while the least (97.75±8.50 eggs) was recorded in the birds that were raised on the control diet. For IB, birds given 0.025% ASA diet recorded the highest total egg production (125.50±6.75 eggs) while IB birds on control diet produced the least number of eggs

(108.75±8.75 eggs). The general observation on feed intake is that this parameter was practically not influenced by ASA supplementation in the diet. There was a significant breed difference ($p<0.05$) in egg weight. The HB birds had a significantly ($P<0.05$) higher egg weight (57.55±0.60g) than the IB birds (56.64±0.55g). The highest egg weight (58.12±0.85g) was observed in the birds that were fed the control diet while the least value (55.87±0.76g) was obtained in birds that were raised on the diet that contained 0.025% ASA. Similarly, significant differences existed in the interaction between ASA levels and breeds. Although, the effect of this interaction between breed and egg weight did not follow a clearly defined pattern, it was clear from Table 4 that IB birds showed decrease in egg weight with corresponding increase in ASA levels while the HB birds maintained stable egg weight with increase in dietary ASA level. Non-significant breed and treatment differences were found in hen-day egg production (HDEP). Significant differences were however observed in HDEP in the interaction between breeds and ASA levels. The HB birds fed 0.050% ASA had the highest (79.28±9.10%) HDEP while the least (61.21±9.23%) was recorded for the HB on the control diet. On the other hand, IB birds recorded the highest (73.57±12.50%) and lowest (63.56±5.20%) HDEP at 0.00% and 0.075% ASA levels respectively. Thus, ASA supplementation in the layers diets improved HDEP in HB and not in the IB breed. There was no significant breed difference ($p>0.05$) in the hen-housed egg production (HHEP). This parameter (HHEP) was however significantly ($p<0.05$) influenced by ASA supplementation in the diet with a decrease in value relative to the control. The interaction between the ASA levels and breeds showed significant differences in the HHEP. While the highest HHEP (73.56±5.02%) was observed in the IB fed the control diet, the least HHEP (49.99±5.25%) was recorded in IB fed 0.050% ASA supplementation.

Discussion

Weight change and livability parameters between the 9th and 16th week of age of Isa brown and Harco black pullets fed different levels of acetylsalicylic acid

The final weight and the weight change of the birds (Table 3) fed the control diet (0.00% ASA) were lower than the final weight and weight change of the chickens that were given 0.025, 0.050, and 0.075% ASA supplemented diets. This showed that dietary supplementation of ASA improved the final weight of the birds at all levels of supplementation relative to the control. This result agrees with the reports of Oluyemi and Adebanjo (1979), Al-Mashhadani, *et al.* (1988) and Al-Obaidi and Al-Shadeedi (2010) who noted that adding ASA to the diets at 0.05 to 0.3% resulted in increased body weight, just as Hassan, *et al.* (2003) also observed that adding 1.5g/l ASA to the drinking water of Japanese quails under heat stress improved their body weight. The improvement in body weight of the birds therefore might have been due to the ability of ASA to lower the body temperature of heat–stressed birds thus resulting in higher level of feed consumption and hence improved body weight. The current study did not however reveal any direct relationship between feed consumption (in Table 4) with improved weight change, thus the observed increase in weight in the ASA treated birds would have been mediated through another mechanism probably due to its inhibition of cyclo-oxgenases thereby disrupting the biosynthesis of prostaglandins and the concomitant suppression of pains, inflammation and elevated temperature (Williams and Buvanendran 2011). From the current study, Isa brown (IB) birds responded better to ASA supplementation in terms of growth accretion than the Harco black (HB) birds. There was also significant difference in the mortality between the breeds. The mortality was higher in HB than in IB birds. The lower mortality and hence, higher livability in IB than in the HB might have arisen from the differences in their genetic make-up (Awobajo*, et al.,* 2007). Again, another likely explanation for the observed differences in mortality could be due to the fact that the black plumage of Harco black may likely absorb more heat from the environment thereby predisposing them to greater heat load, heat stress and hence higher mortality (Aro*, et al.*, 2017). Although there were significant differences in the mortality rate among the treatments, The ASA supplementation only reduced mortality rate at 0.050% ASA level while mortality at other graded levels were significantly higher than the control. Earlier study by Abd-Ellah*, et al.* (1997) had reported a reduction in mortality in the aspirin treated (600 – 800mg/kg feed) laying hens, the dosage applied by them was much higher than that used in the present study. The significant reduction in mortality might have been due to the ameliorative effect of ASA as an anti-stress agent. Although, the effect of the graded levels of ASA on mortality in the laying birds did not follow a clear-cut trend, the interaction between breeds and ASA levels revealed that both the IB and HB breeds recorded the lowest mortality and hence highest livability when their diets were supplemented with 0.050% ASA.

Egg performance parameters at 32nd week of age in Isa Brown and Harco black layers fed different levels of acetylsalicylic acid

Total egg production (Table 4) was significantly improved by the dietary ASA supplementation. This agrees with Reid*, et al.* (1964) and Thomas*, et al.* (1966) who reported that total egg production increased when hens were fed diets containing 0.050% aspirin. Abd-Ellah*, et al.* (1997) also noted, among other things, that egg production, egg weight and feed intake improved in aspirin treated laying hens. The improvement may have been due to the anti-pyretic, analgesic and anti-inflammatory effects of ASA (Aro*, et al.*, 2017). This position was also corroborated by Hassan*, et al.* (2003) who studied the effect of acetylsalicylic acid in drinking water on reproductive performance of Japanese quails (*Coturnix coturnix japonica*) and found that adding 1.5g/l of ASA to the drinking water of Japanese quails under heat stress improved egg production. The current study however established that total egg production was better improved through ASA supplementation in HB breed than in IB breed. Results on egg weight revealed that this parameter was not influenced by ASA supplementation in the diets as the observed differences did not follow a well defined trend. Balog and Hester (1991) fed ration containing 0.05% ASA and found that egg weight was not significantly influenced. The observed difference in egg weight between the IB and HB could be due to their different genetic constitution. Significant differences were not observed at breed and treatment levels in terms of hen-day egg production (HDEP) under this current study. This showed that HDEP was not influenced by ASA supplementation in the layers diets at the four different levels of supplementation. Mohammed (2010) studied the effect acetyl salicylic acid on hen-day production and found that adding 0.5, 1.0 and 1.5g/l of aspirin to the drinking water of laying hens significantly increased HDEP. This author however used ASA at levels much higher than were used in the present study. At the level of interaction between the breeds and ASA levels, the trend of observation was an increase in HDEP in HB breed in response to ASA supplementation while the IB breed showed a negative response. Thus, ASA supplementation in the diets of the HB breed could potentially increase HDEP than in the IB breed. From the results of this current study, the Harco black birds given 0.050% ASA diet produced the best results over the birds in other treatments. In the case of hen-housed egg production, no significant difference was observed in hen-housed egg production (HHEP) between the IB and HB breeds. The observed differences at both the treatment and interaction levels were probably reflections of the percentage mortality in the birds. For instance, the highest HHEP in birds fed 0.050% ASA supplementation was as a result of the lowest mortality rate recorded in the treatment. The interaction of breed and ASA treatment recorded the highest HHEP in Isa Brown on 0.00% ASA fed diets. This could be attributed to the different mortality rates obtained in the four treatment diets, thus lending credence to the fact that HHEP is always a factor of mortality rate within the layers' flock.

Conclusion

Based on performance parameters, it could be concluded that Isa Brown breed was heavier and had lower mortality rate when compared with Harco Black breed. Weight change increased with increase in acetylsalicylic acid level. The use of acetylsalicylic acid at 0.050 % significantly reduced mortality in the birds and hence conferred the best livability. Supplementation of acetylsalicylic acid in these layers' diets increased total egg production relative to the control and in a dose dependent manner. The current study established that total egg production was better improved through acetylsalicylic acid supplementation in HB breed than in IB breed. Acetylsalicylic acid supplementation in the diets of the HB breed could potentially increase HDEP than in the IB breed. The use of acetylsalicylic acid at the current study's level of supplementation did not impact negatively on laying chickens' egg production performance.

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