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Original Article

PERFORMANCE IMPROVEMENT IN LAYER BIRDS SUPPLEMENTED WITH HERBAL LIVER TONIC AND ANTISTRESSOR PRODUCT DURING SUMMER STRESS

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ABSTRACT

Objective: The present study was designed to study the efficacy of herbal liver tonic product Superliv liquid (*M/S* Ayurvet Limited) on overall performance in layer birds during summer stress.

Methods: Seventy-two commercial layer strain BV300 were randomly divided into three groups. Each group was subdivided into three replicates (n=8). Group T0, the control group, supplemented with commercial layer mash only. In Group T1 commercial layer mash supplemented with synthetic vitamin C at 100 gm/tonne of feed and group T2 commercial layer supplemented with herbal liver tonic-Superliv Liquid at 10 ml/100birds/day (*M/S* Ayurvet Limited). The layer performance parameters like feed consumption, feed efficiency, egg weight, egg production and egg quality were studied.

Results: Feed efficiency was also found to be improved in Superliv liquid supplemented group T2. Significant ($p<0.05$) improvement in egg weight and egg production in Superliv liquid supplemented group T2. Serum cortisol level was also significantly reduced in group T2 birds after Superliv liquid supplementation.

Conclusion: From the overall study, it was concluded that the supplementation synthetic vitamin C as well as herbal liver tonic Superliv liquid at the levels studied in the experiment found to be beneficial to improve the performance parameters like feed efficiency, egg weight, egg production in laying hens during summer stress.

Keywords: *Herbal liver tonic, Synthetic vitamin C, Layer performance, Summer stress*

INTRODUCTION

In poultry industry improving feed utilization and increasing the productivity has become a core issue. The liver plays a key role as being the center of a number of digestive, metabolic and productive activities [1]. Oxidative stress leads to biological damage and is regarded as one of the causes of several pathologies that affect poultry growth [2]. Oxidative stress should be considered as part of the stress response of broiler chickens to heat exposure [3]. Several cellular events are triggered when cells and organisms are exposed to stress injury. Liver heat shock proteins level increased significantly during heat stress [4]. During incubation liver function and development depressed due to heat stress [5]. In heat stressed broilers, liver cells showed "fatty degeneration" with dilation of sinusoid [6]. High environmental temperature cause high mortality due to ascites [7, 8]. In view of the above facts, the aim of the present investigation was to study the efficacy of herbal liver tonic product Superliv liquid (*supplied by M/S Ayurvet Ltd., Baddi)* on overall feed consumption, feed efficiency, egg weight, egg production and egg quality parameters in commercial laying hens. Superliv Liquid consists of herbs viz. *Andrographis paniculata*, *Azadirachta indica*, *Boerhaavia diffusa*, *Phyllanthus niruri*, these herbs by virtue of their antioxidant and hepatoprotective properties [9-12] tone up the liver and alleviates heat stress in poultry birds. This study aimed to evaluate the efficacy of herbal liver tonic product Superliv liquid (M/S Ayurvet Limited) on overall performance in layer birds during summer stress.

MATERIALS AND METHODS

The current study was conducted during the extremely hot summer period (May to June) at Department of Poultry Science, KNP College of Veterinary Science Shirwal, Satara, Maharashtra state, India. Satara being located the western limit of the Deccan tableland, lies between at 16.50 ° and 18.10° North, and 73.45 ° and 15.00 ° East. Here summer is the driest part of the year, and May is observed as the hottest month with an average daily maximum temperature of 36.8 °C and the relative humidity in the afternoon between 35 and 40%.

Experimental design

The experiment was conducted on 72 commercial layer strain BV300 (highly refined breed of excellent genetic potential, and one of the best layer breeds in the world) from 36 to 41 w of age. The layer birds were randomly divided into three groups. Each group was subdivided into three replicates of 8 birds in each. Group T0, control group, supplemented with commercial layer mash only. In Group T1 commercial layer mash supplemented with synthetic vitamin C at 100 gm/tonne of feed and group T2 commercial layer supplemented with herbal liver tonic Superliv Liquid at 10 ml/100birds/day (*M/S* Ayurvet Limited). The parameters viz. weekly feed consumption, weekly feed efficiency, weekly average egg production per hen per group, weekly average egg weight, egg quality parameters at 42nd day of the trial period (yolk ratio, albumen ratio, shell ratio, shell thickness) were studied during the course of the experiment. The experimental birds were reared in the Californian cage system. The identical management practices were followed during the course of the experiment.

Statistical analysis

The data from the study was pooled and subjected to suitable statistical analysis using Factorial Completely Randomized Design as described by Snedecor and Cochran [13].

RESULTS

Feed consumption

The statistical analysis of data on weekly feed consumption (table 1) found to be significantly varied among the various groups. The feed consumption was significantly ($p<0.05$) increased in laying hens of group T1 at 36th, 37th and 38th and lowered at 41st weeks of age than control T0. The feed consumption was significantly increased in laying hens of group T2 at 38th weeks of age in comparison to control T0. The feed consumption at 39th and 40th weeks of age in both treated groups T1 and T2 was non-significant than control T0.

The overall mean feed consumption in T1 (852.80), T2 (818.53) and T0 (821.37) was not significantly altered. From the overall study it was observed that, the feed consumption was unaffected in T1 as well as T2 groups.

Table 1: Weekly feed consumption (g/week) per layers from different groups

Age	T0 Control	T1 supplemented with synthetic vitamin C	T2 supplemented with Superliv liquid	Significance
36 Wk	752.81±3.31^{b}	767.44±1.00^{a}	758.72±1.84^{ab}	S
37 wk	812.67±13.82^{b}	859.64±0.86^{a}	810.61±1.94^{b}	S
38 wk	794.00±5.67^{c}	889.34±0.78^{a}	852.00±7.25^{b}	S
39 wk	848.75±0.33	902.67±24.55	809.30±28.80	NS
40 wk	887.17±14.82	937.74±17.59	856.63±1.53	NS
41wk	832.84±11.00^{a}	760.00±9.78^{b}	823.93±4.18^{a}	S
Overall Mean	821.37±18.91	852.80±29.99	818.53±14.52	NS

Values (mean±SEM) (n=24) bearing different superscript within row differed significantly (p<0.05)

Feed efficiency

The feed efficiency on the basis of per dozen of eggs produced (table 2) at 38th weeks of age found to be significantly (p<0.05) poor while improved at 41st weeks of in group T1 in comparison control T0, whereas at other weeks, it was comparable. In group T2, the feed efficiency was significantly (p<0.05) improved at 39th and 41st weeks of age i.e. 1.50 and 1.44, respectively while it was numerically improved during all other weeks then both groups T1 as well as T0 (table 2). The overall mean feed efficiency was also found to be improved in T2 than both T1 and control T0.

Table 2: Weekly feed efficiency (on the basis of per dozen of eggs produced) of layers from different groups

Age	T0 control	T1 supplemented with synthetic vitamin C	T2 supplemented with Superliv liquid	Significance
36 Wk	1.34±0.02	1.35±0.03	1.37±0.02	NS
37 wk	1.50±0.01	1.53±0.02	1.44±0.01	NS
38 wk	1.54±0.03^{b}	1.65±0.01^{a}	1.48±0.01^{b}	S
39 wk	1.66±0.01^{a}	1.62±0.04^{a}	1.50±0.04^{b}	S
40 wk	1.65±0.04	1.63±0.06	1.43±0.03	NS
41wk	1.77±0.05^{a}	1.42±0.03^{b}	1.44±0.05^{b}	S
Overall Mean	1.57±0.06	1.53±0.05	1.44±0.01	NS

Values (mean±SEM) (n=24) bearing different superscript within row differed significantly (p<0.05)

Egg weight

The weekly average egg weight in gram (table 3) was significantly (p<0.05) increased at 39th and 40th weeks of age in both T1 and T2 groups in comparison to control T0. Similar trend was observed in rest of the weeks but non-significant. The overall mean egg weight for T1 (58.79) as well as T2 (58.20) also found to be significantly increased (p<0.05) in comparison to control T0 (56.79).

Table 3: Weekly average egg weight (g) from different groups

Age	T0 control	T1 supplemented with synthetic vitamin C	T2 supplemented with Superliv liquid	Significance
36 Wk	55.70±0.20	57.47±0.05	57.81±0.69	NS
37 wk	56.58±0.31	57.81±0.01	57.68±0.23	NS
38 wk	56.69±0.57	57.37±0.01	57.60±0.40	NS
39 wk	56.56±0.33^{b}	59.27±0.13^{a}	59.10±0.05^{a}	S
40 wk	57.22±0.02^{c}	59.31±0.01^{a}	58.66±0.02^{b}	S
41wk	58.04±0.84	60.20±0.02	58.38±0.01	NS
Overall Mean	56.79±0.318^{b}	58.79±0.480^{a}	58.20±0.247^{a}	S

Values (mean±SEM) (n=24) bearing different superscript within row differed significantly (p<0.05)

Egg production

The weekly egg production per hen (table 4) was significantly (p<0.05) increased at 39th weeks of age in T1 than the control T0 while it was numerically increased at 36th, 37th, 38th and 41st weeks of age. Weekly egg production per hen in T2 was significantly (p<0.05) increased at 37th, 38thand 39th weeks of age than control T0 while it was numerically increased at 40th and 41st weeks of age.

The overall mean egg production was also found to be numerically improved in both T2 (6.75) and T1 (6.65) groups than control T0 (6.44).

Table 4: Weekly egg production per hen from different groups

Age	T0 control	T1 supplemented with Synthetic vitamin C	T2 supplemented with Superliv liquid	Significance
36 Wk	6.73±0.10	6.86±0.08	6.45±0.25	NS
37 wk	6.50±0.05^{b}	6.66±0.05^{ab}	6.78±0.005^{a}	S
38 wk	6.17±0.19^{b}	6.53±0.03^{ab}	6.88±0.005^{a}	S
39 wk	6.17±0.04^{b}	6.66±0.06^{a}	6.76±0.01^{a}	S
40 wk	6.78±0.08	6.60±0.18	7.05±0.05	NS
41wk	6.30±0.11	6.62±0.01	6.60±0.05	NS
Overall Mean	6.44±0.11	6.65±0.04	6.75±0.08	NS

Values (mean±SEM) (n=24) bearing different superscript within row differed significantly (p<0.05)

Egg quality

The quality parameter viz. Yolk ratio, albumen ratio, shell ratio and shell thickness (mm) were recorded at the end of the experiment (42nd) are depicted in table 5. The statistical analysis of data indicated that, the shell thickness of egg was significantly increased in both groups T1 and T2 than the control T0. However, the other egg quality parameter like yolk ratio, albumen ratio, and shell ratio were non-significant.

Table 5: Egg quality parameters at 42nd day of trial

Age	T0 control	T1 supplemented with synthetic vitamin C	T2 supplemented with Superliv liquid	Significance
Yolk ratio	25.88±0.42	26.42±0.71	26.65±0.54	NS
Albumin ratio	61.94±0.45	61.64±0.90	60.90±0.67	NS
Shell ratio	12.17±0.19	11.93±0.37	12.44±0.27	NS
Shell thickness (mm)	0.37±0.004[b]	0.38±0.001[a]	0.38±0.001[a]	S

Values (mean±SEM) (n=24) bearing different superscript within row differed significantly (p<0.05)

Table 6: Serum cortisol level of layer birds at the 35th day of trial

Treatment	T0-control	T1-synthetic vitamin C	T2-Superliv liquid
Cortisol (µg/dl)	0.33±0.04[a]	0.34±0.08[a]	0.30±0.04[b]

Values (mean±SEM) (n=24) bearing different superscript from different rows differed significantly (p<0.05)

Serum cortisol level (µg/dl)

Serum cortisol level (at 35th day of trial period) was significantly reduced after Superliv liquid supplementation to group T2 (0.30) in comparison to both synthetic vitamin C supplemented group T1 (0.34) and unsupplemented control group T0 (0.33) (table 6).

DISCUSSION

Feed is a major component, affecting net return from the poultry business, so to ensure more net return and to reduce expenditure on feed many research strategies have been practiced such as introducing feed supplements and feed additives [14]. In overall the supplementation of both synthetic vitamin C, as well as Superliv liquid at the levels used in the experiment, did not affect the feed consumption in laying hens. However, the feed efficiency was found to be improved (p<0.05) in laying hens supplemented with herbal liver tonic Superliv liquid during summer stress. Feed efficiency defined as per dozen of eggs produced per week with reference to the amount of feed consumed by birds [15]. The improvement in the feed efficiency of laying hens on herbal liver tonic Superliv liquid supplementation might be due to its constituent herb *Azadirachta indica* reported for improved nutrient conversation efficiency [16]. A similar result was observed by Ma *et al.* [17] who found that a diet supplemented with herbs (*Ligustrum lucidum* and *Schisandra chinensis*) significantly improved the feed conversion ratio in laying hens. Chatterjee and Agrawala [18] reported that supplementation of herbal liver stimulants improved gastrointestinal micro-environment of the birds and thereby enhanced utilization of nutrients and ultimately increased in productivity without posting any adverse effect on animal systems. The digestion stimulatory and the gastro-protective effects as reported by Abdulla *et al.* [19], for the herbal components *Andrographis paniculata* and *Phylanthus niruri* in the commercial herbal product.

The supplementation of both synthetic vitamin C as well as Superliv liquid significantly (p<0.05) improved the egg weight during summer stress. Egg weight has highly economic implications in poultry [20]. The supplementation of both the synthetic vitamin C as well as Superliv liquid improved the egg production parameter than the control during summer stress. Ascorbic acid supplementation improves egg weight during heat stress [21]. Herbal liver tonic Superliv liquid contains herbs viz. *Azadirachta indica* along with its antioxidant property it improve egg production in laying hens [22].

In the egg processing enterprises egg quality parameters affects the desirability and price of the product [23, 24]. Ascorbic acid supplementation improves shell quality [25]. Shell thickness of eggs produced by laying hens after supplementation of synthetic vitamin C as well as Superliv liquid found to be significantly (p<0.05) improved than the control without affecting other egg quality parameters studied in the experiment. Superliv liquid contains herbs viz. *Phyllanthus niruri* [26] reported for improving egg quality parameters. Neupane *et. al.* [27] studied the effect of Herbal liver stimulants on the performance of Hy-line commercial layer and reported that herbal supplement Superliv and Livoliv in diet improved egg production which corroborates with present study. Superliv constituent herb *Boerhavia diffusa* has been shown to contain a large number of bioactive compounds such as vitamins, flavonoids, alkaloids, steroids, triterpenoids, lipids, lignins, carbohydrates, proteins and glycoproteins [28]. It also contains large quantities of potassium nitrate [29]. Its root extracts have been shown to possess anti-hepatotoxic properties and has been used in the treatment of liver disorders. Cortisol a steroidal hormone, released in response to heat stress conditions [30]. The decrease in cortisol level in Superliv supplemented group was because of its constituent herbs viz. *Boerhaavia diffusa*, *Phyllanthus emblica* which posse antioxidant and immunomodulatory activities [31, 32].

CONCLUSION

From the results of the present investigation it can be concluded that the herbal formulation Superliv liquid (M/S Ayurvet Limited) as well as synthetic vitamin C supplementation improved the performance parameters in laying hens during summer stress. Herbal formulation Superliv liquid can be efficiently used for performance improvement in layer birds during summer.

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CONFLICT OF INTERESTS

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