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INCLUSION OF ALFALFA (*Medicago sativa* L.) INTO LAYING HENS DIET DURING STRESS CAUSED BY FORCED MOLTING

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Abstract- Deviation from normal conditions under which poultry kept could be caused by many factors, and these will adversely affect poultry health and performance. This deviation from normal conditions known as stress. Factors that cause stress such as extreme heat or cold, high humidity, poor ventilation, forced molting, transport, overcrowding and vaccination. Forced molting is practiced by many producers to increase egg-laying cycles. Producers perform molting either by light restriction or feed removal for 5-14 days. All these will suppress birds immunity, therefore birds health and performance will be affected. Many researches assured susceptibility of birds to salmonella species due to feed withdrawal. Due to the progress of concern of poultry welfare an alternative methods to feed removal were discussed and examined by scientists. Use of diet containing high fibre - low energy was suggested by researchers to induce molting in laying hens. Dietary Alfalfa seems to be a preferable alternative to feed deprivation for molt induction in laying hens.

Keywords- Alfalfa, feed withdrawal, forced molting, laying hens, Salmonella, welfare

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Introduction

Induction of forced molt by feed withdrawal is considered as poor welfare practice because it produces stress and reduces birds immunity. Decrease in numbers of white blood cells and change in its differential count has been reported as the result of feed deprivation [1]. Also reduction in lymphocytes numbers according to feed deprivation was observed by Holt [2]. In addition, forced molt by feed removal makes birds more susceptible to infection by *Salmonella enteritidis* and excreted higher number of organism in the manure [3]. Furthermore, Murase, et al [4] stated occurrence of high level of salmonella contamination in commercial flocks after molt. Therefore, there is a great interest to find alternative methods to induce molt in laying hens without increased risk of salmonella contamination. Alfalfa meal was tested to induce molt in laying hens. McReynolds, et al [5,6] reported that alfalfa meal is effective in producing molt in laying hens and reducing *Salmonella enteritidis* infection during molt.

The aim of this review is to discuss the effectiveness of alfalfa meal in induction of molt with reduction in stress and susceptibility to *Salmonella enteritidis* infection, hence improving poultry welfare practices.

Poultry Welfare and Forced Molting

In the last years poultry welfare get a lot of attention. Thereafter the concern regarding poultry welfare spread around the world. Consequently, legislations and standards for keeping poultry were performed. Farm Animal Welfare Committee (FAWC) stated five freedoms to be accomplished to consider good welfare. One of which is freedom of hunger and thirst [7]. Therefore, forced molting via feed deprivation received a severe criticism by welfare groups [8].

Alternative Methods to Feed Deprivation

Many dietary supplementations were studied to achieve molt in laying hens. Breeding [9] studied use of low calcium-high zinc diet and Berry & Brake [10] tested supplementation of low sodium-high zinc diet. However, some problems will expected to occur when use these two diets. Low calcium diet may lead to temporary paralysis [11] or osteoporosis [12]. Low sodium diet may cause cannibalism [13]. Efficiency of dietary grain barley to achieve molting in laying hens was confirmed by Petek & Alpay [14]. Aygun & Yetisir [15] declared that, barley, wheat bran and oat diets could successfully induce molt in laying hens. Sgavioli, et al [16] added 2800 ppm of zinc to laying hens diet so as to induce molt. Seo, et al [17] examined the effects of offering wheat middling (by-product of wheat processing) to laying hens on *Salmonella enteritidis* excretion and internal organ contamination against feed withdrawal. Authors noticed that, wheat middling could be used as alternative to feed removal so as to induce molt in laying hens and in the same time avoid salmonella problem.

Alfalfa Meal

Alfalfa (*Medicago sativa* L.) is a forage legume which consists of a considerable amount of protein and amino acids particularly leaves, therefore used as a source of protein for ruminants [18]. Baraniak [19] assured preferable protein, energy and vitamins content of fresh green leafy plant for ruminants nutrition, and explained its restriction for monogastric animals because its higher content of fibre. Dansky [20] mentioned that, limited amounts of dehydrated alfalfa meal used in poultry diets because it contains high level of fibre and low level of energy. Tkáčová [21] reported that, metabolizable energy, fibre, protein, lysine, methionine, methionine+cystein, threonin, tryptophan and carotenoids content of alfalfa meal are 4.0 MJ/kg, 257 g/kg, 164 g/kg, 6.95 g/kg, 2.40 g/kg, 4.10 g/kg, 6.66 g/kg, 2.10 g/kg and 293 mg/kg respectively. Al-shami, et al [22] found that, dried alfalfa leaves contain 96.1% dry matter, 22.75% crude protein, 1.14% ether extract, 13.26% crude fibre, 5.81% ash, 53.14% nitrogen free extract and 2300 Kcal/kg metabolizable energy.

Use of Alfalfa Meal in Laying Hens Diet

As mentioned by Dansky [20] low level of alfalfa meal used in monogastric animals because the presence of high fibre content. Mourão [23] declared that, addition of alfalfa to laying hens diet decreased feed intake, egg weight, egg production and egg mass. Some benefit effects of alfalfa on production performance of laying hens has been reported. Wen-jun [24] noticed that, alfalfa leaf meal improve egg shell thickness and decreased egg yolk cholesterol. Enhancement of egg yolk colour was also reported due to supplementation of alfalfa meal [25]. One of these benefits of alfalfa meal is induction of molt [5,6,14,16,26-29]. Dietary alfalfa was compared to feed deprivation as a method of molt induction in laying hens. Researchers found that, dietary alfalfa can be used instead of feed withdrawal to induce molt because it resulted in eggs with significantly (p<0.05) lower "α*" level of colorimetry and higher egg weights and length. In addition, when sensory consumer test was performed no significant differences were observed in color or flavor/texture scores in eggs produced by molted hens either via feed removal or dietary alfalfa [26]. Sgavioli, et al [16] announced that, supplementation of alfalfa to layers diet so as to induce molt did not produce significant differences in production performance and egg quality during post-molt period when compare to feed removal. Also, it has been reported that, dietary alfalfa decreased nonnutritive pecking behavior, movements of the head and higher feeding momentum [28,29] maintained mechanical properties of bones during molt [30,31]. Regarding immune responses during molt, it has been found that, dietary alfalfa increased oxidative burst and degranulation activities. Also, it increased heterophil functions numerically during molting period in comparison with feed removal method [27] and resulted in decreased some of physiological stress indicators that followed forced molt by feed removal [32,33] and inflammation according to heterophil: lymphocyte ratio and α1–acidglycoprotein levels in the serum when compared to feed deprivation [33]. Furthermore, it was confirmed that alfalfa diminished Salmonella enteritidis infection in molted hens [5,6]. This may be due to fact that, higher dietary fibre improve function of colon via increasing fecal weight and frequency of defecation [34] or due to progress of mucosal structure and function and enhancing commensal bacteria in the gut [35].

Conclusion

It was concluded that, alfalfa meal is effective in induce molt and reduce some of physiological stress, inflammation and Salmonella enteritidis infection that followed molt via feed removal. In addition, it maintains immune response and mechanical properties of bones during molt.

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