

International Conference on Inventions & Innovations for Sustainable Agriculture 2016, ICIISA 2016

## Effect of Eggshell as a Calcium Source of Breeder Cock Diet on Semen Quality

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### Abstract

The experiment was conducted to determine the effects of calcium source (coarse limestone, fine limestone and grounded eggshell) in breeder cock diets on feed intake and semen quality. Fifteen Arbor Acres breeder cocks at 61 weeks of age were randomly allotted into 3 treatments of 5 replications, in Randomized complete block design. T1 (control group); coarse limestone: fine limestone (50:50), T2; coarse limestone: egg shell (50:50) and T3; egg shell (100). Body weight were recorded weekly, feed intake were recorded daily. Ejaculates were collected by abdominal massage method twice weekly to evaluate semen quality. The results showed that body weight and feed intake were not significantly different ( $P>0.05$ ). Semen quality were evaluated with sperm concentration, sperm motility, live sperm, abnormal sperm were not significantly different ( $P>0.05$ ). In conclusion, grounded egg shell can be used as calcium source in breeder cock diet with normal feed intake and semen quality.

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Peer-review under responsibility of the Faculty of Animal Sciences and Agricultural Technology, Silpakorn University

*Keywords:* eggshel; calcium source; breeder cocks

### 1. Introduction

Hen eggshell, a waste material from domestic sources such as hatcheries, poultry farms, fast food industries, egg product factories, homes and restaurant, has been a serious matter as global awareness regarding organic waste materials and pollution problems was increased (Than et al., 2012, King' Ori et al., 2011).

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The management of agricultural wastes is indispensable and a crucial strategy in global waste management. For sustainable development, wastes should be recycled, reused, and channeled towards the production of value added products (Abdulrahman et al., 2014).

Chicken eggshells can be used as an alternative soil stabilizer like lime since they have the same chemical composition. Although, the most common source of calcium for layer feeds is limestone. Due to the composition of the egg shell is approximately 98.2, 0.9, 0.9% calcium carbonate, magnesium and phosphorus (phosphate), respectively (Romanoff et al., 1949). Additionally, eggshell membrane consists of collagen as a component. Collagen is a type of protein, fibrous in nature that connects and supports other bodily tissues, such as skin, bone, tendons, muscles and cartilage. Eggshell membrane collagen is very low in autoimmune and allergic reactions as well as high in bio-safety and is of similar characteristics to other mammalian collagen. Eggshells/shell membranes have multiple uses in nutrition, medicine, construction and art works (King'ori, 2011). Calcium accounts for 56% of the motility-stimulating activity of fowl spermatozoa and also fowl seminal plasma. Restores and stimulates the motility of fowl spermatozoa at 40 °C in presence of calcium (Ashizawa and Wishart, 1987). Ca/P ratio of eggshell was  $\geq 1.67$  (Abdulrahman et al., 2014). Calcium recommended in cocks diet for attaining good semen quality could not be the same as recommended for female (Khalil et al., 2012). NRC (1994) and Kappleman et al. (1982) concluded that there were no differences in the reproductive performance of broiler breeder cockerels fed 0.5 to 7 g of calcium daily per bird. While NRC (1994) and Norris et al. (1972) reported that diets containing 0.1 percent nonphytate phosphorus were satisfactory for Single Comb White Leghorn (SCWL) cockerels. Bootwalla and Harms (1989) found that no more than 110 mg of nonphytate phosphorus per bird daily were needed for maintaining reproductive capacity and bone integrity in broiler breeder cockerels. However, calcium and phosphorus metabolism should be relate, due to low calcium levels increase phosphorus excretion and low phosphorus levels increase calcium excretion. Eggshell calcium is probably the best natural source of calcium and it is about 90% absorbable (Bee, 2011). It is a much better source of calcium than limestone or coral sources. Hence, utilization of eggshell waste inverting to animal diet which would transform the waste eggshells into a valuable item; giving financial benefits to the competitive egg processing industry including environmental friendly.

The scope of current study was to investigate the effect of eggshell as calcium source in Arbor Acres breeder cocks diets on body weight, feed intake and semen quality.

## 2. Materials and Methods

### 2.1 Experimental animal and diets

Eggshell (produced by Ross308 Hens) waste from Chaveewan hatcheries, Sriracha district, Chonburi province in Thailand were collected and transported to laboratory area at Silpakorn University. The eggshell was washed thoroughly tap water. Then, it was dried in hot air oven at 95 °C for 4 h. The dried eggshell was grounded, and storage at room temperature until dietary treatment preparation. The composition of the eggshell was analyzed by proximate analysis (Table 1.)

The experimental diet was formulated according to the standards prescribed in NRC (1994). Fifteen Arbor Acres breeder cocks at the age of 61 weeks were randomly allotted into 3 treatments of 5 replications, in Randomized complete block design. The animals were raised by feeding diet containing different calcium sources as T1; control group coarse limestone: fine limestone (50:50), T2; coarse limestone: egg shell (50:50) and T3; egg shell (100). follow Ingredients composition and nutrient levels of the experimental diets (Table 2.). The experiment was designed and conducted for a period of three weeks during summer season (March - April 2015) at the Poultry Farm, Faculty of Animal Science and Agricultural Technology, Silpakorn University. During the period of study, the average minimum-maximum temperature and relative humidity recorded were 34.1-36.5°C and 68-73 percent, respectively.

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