

Yutthana Saengchan 2008: A Study of Water Restriction in Laying Hens. Master of Science (Agriculture), Major Field: Animal Science, Department of Animal Science. Thesis Advisor: Associate Professor Nirat Gongruttananun, Ph.D. 83 pages.

Two experiments were conducted with ISA Brown laying hens to investigate the effect of drinking water restriction on fecal moisture, production performance, egg and eggshell quality, reproductive performance, blood physiology and kidney pathology. In each experiment, the birds were housed in cages (2 birds/cage) situated in a temperature-controlled shed. In Experiment 1, a total of 256 hens, 44 wk of age, were randomly divided into four groups. The first treatment group was provided with water at all times (250 ml/b/d) (control group). The birds in the other groups were given water as follows; 90% (90%-water group), 80% (80%-water group) and 70% (70%-water group) of the water given the control group. The results showed that feed intake of the 80% and 70%-water groups was significantly lower than that of the control group ($P < 0.05$), whereas the birds in the 90%-water group consumed significantly less feed than those in the control group only during the last four weeks of the study ($P < 0.05$). Average egg production, shell weight and shell thickness of the birds in the 90% and 80%-water groups were not significantly different from those of the birds in the control group ($P > 0.05$), though a decrease in egg weight was found in the water-restricted groups in some periods of the study ($P < 0.05$). Fecal moisture of the water withdrawal groups was significantly lower than that of the control group transiently ($P < 0.05$). There were no significant differences in ovary weight and in total number of ovarian follicles between the control, 90% and 80%-water groups ($P > 0.05$). On the other hand, the number of small follicles of the hens in the 70% water group was less than that of the hens in the control group ($P < 0.05$). Likewise, the ovary weight of the hens in the 70%-water group was lower than that of the hens in the control group ($P < 0.05$). Yield of abdominal leaf fat was reduced in the 80% and 70%-water groups as compared with that of the 90%-water group ($P < 0.05$), but was not significantly different from that of the control group ($P > 0.05$). The average gizzard weight of the 80%-water group was significantly higher ($P < 0.05$) than that of the 90%-water group, but was not significantly different from those of the control and 70%-water groups ($P > 0.05$). There were no significant differences in parameters of feed conversion ratio, yolk color, albumen quality, blood parameters and kidney asymmetry or kidney lesions among the experimental groups ($P > 0.05$). In Experiment 2, 224 hens, 56 wk of age, were divided into four groups of 56 each. The birds in the first treatment group were allowed to have water available at all times (control group). The hens in the other three groups; 45min-water, 30min-water and 15min-water groups were placed on a restricted timing of the water supply, with drinking water provided three times per day for 45, 30 and 15 minutes each time, respectively. In general, feed intake of the birds in the three experimental groups was significantly lower than that of the birds in the control group ($P < 0.05$). There were no significant differences in egg production between the control, 45min-water and 30min-water groups throughout the experimental period of four weeks ($P > 0.05$), whereas a lower egg production was found in the 15min-water group ($P < 0.05$). Average egg weight of three water-restricted groups was significantly lower than that of the control group in some periods of the trial. At the first week of the study, the feed conversion ratio of the 45min-water group was comparable to that of the other two water-restricted groups, all of which were significantly lower than that of the control group ($P < 0.05$). Albumen height of the 45min-water group was significantly lower than that of the control group on Week 2 and 4 of the experiment ($P < 0.05$), whereas no significant differences were observed between the control, 30 and 15 min-water groups ($P > 0.05$). The score of yolk color of the birds in 15 min-water group was significantly higher than those of the control and 45 min-water groups on Week 3 of the experimental period ($P < 0.05$). Shell weight of the birds in the 45min-water group was comparable to that of the birds in the control group, whereas those of the 30 and 15 min-water groups were significantly lower than that of the control group transiently ($P < 0.05$). A similar pattern was also found for the eggshell thickness characteristic. In addition, trend toward decrease fecal moisture was observed in the birds subjected to the water restrictions. A decrease in excreta moisture became more pronounced for the birds in the 15min-water group ($P < 0.05$). The number of small follicles of the birds in the three groups of water restriction was less than that of the control group ($P < 0.05$). Nevertheless, a decrease in ovary weight was observed only for the hens in the 15min-water group as compared to that of the birds in the control group ($P < 0.05$). Average abdominal fat weight of the 45min-water group was significantly less than that of the 15min-water group ($P < 0.05$), but not significantly different from those of the control and 30 min-water groups ($P > 0.05$). No detrimental effects were found in the blood parameters, kidney weight, symmetry ratio, or histological structure of the kidneys in any of the experimental bird groups ($P > 0.05$). It was concluded that fecal moisture could be slightly reduced by either providing the birds with 80-90% water of *ad libitum* intake or giving water three times a day for 30-45 minutes each time without adverse effect on egg production, shell quality, blood parameters or renal morphology, except for decreased egg weight. However, hens receiving water three times a day for 30-45 minutes each time sometimes produce eggs with a smaller size and thinner shell than the birds having continuously available water.

Yutthana Saengchan

Student's signature

Nirat Gongruttananun

Thesis Advisor's signature

14 / May / 2008