



Progress In Poultry

"THROUGH RESEARCH"

THE EFFECT OF SHORT-TERM FEED OR WATER REMOVAL ON VARIOUS EGG CHARACTERISTICS

Donald Bell, **Farm** Advisor
Riverside County

As an aid to diagnosing the cause of a sudden change in layer performance, it is of interest to know what happens when birds are deprived of feed or water for short periods of time. Recent experiments at the University of Florida with 65- to 70-week-old Leghorn hens studied the effect of 12, 24, 48 or 72 hours of starvation on subsequent egg production. When feed was withheld for 72 hours, most birds had a pause in egg production of 7 to 10 **days**, after which time normal production resumed. Withholding feed for 48 hours resulted in some birds having a **7- to 10-day pause**, but most hens on this treatment showed no effect or a **pause** of shorter duration. No loss in egg production was observed when feed was withheld for 12 to 24 hours.

There is a lack of information on the effect of short-term deprivation of feed or water on various characteristics of the egg itself. The investigation reported here was conducted in Riverside County to determine the effects of 12 to 24 hours of feed or water removal on the size, quality, and weight of component parts of eggs laid.

METHODS

In September 1975, eighty individually caged Leghorn hens, $2\frac{1}{2}$ years old, were observed over a 3-day period. For **each** egg the time of lay was recorded, the egg was identified, and the following measurements were made:

- Egg weight
- Albumen height
- Haugh units
- Yolk weight
- Albumen weight
- Shell weight
- Shell thickness

When the first egg was laid, one of the following treatments was initiated:

1. Full feed and water until the second egg was laid on the following day (control).
2. No feed for the first 12 hours only--water available.
3. Feed for the **first 12 hours** but thereafter removed until the next egg was laid on the following day---water available.
4. No feed between the time of laying the first and second egg--water available.
5. No water between the time of laying the first and second egg--feed available.

Only 44 of the 80 hens met the requirements of egg production on successive days. All measured changes between the first and second eggs were adjusted to compensate for the* normal changes occurring in the eggs laid by the control hens.

(continued)

Results were statistically analyzed by the analyses of variance and a modification of the Duncan's Multiple Range Test.

RESULTS

Egg Weight

The only treatment which produced a significant change in egg size was the one in which the birds were without water during the entire time period. These eggs declined in weight by 9.2 percent. This change would be equivalent to a loss of 2.2 ounces per dozen in a flock normally producing 24-ounce eggs. Obviously, this would move more eggs into the medium-size category.

Albumen Height and Haugh Units

From a statistical standpoint, neither albumen height nor Haugh unit value was affected by any of the treatments. All of the feed removal treatments experienced a numerical improvement in both albumen height and Haugh units with the **full**-period feed removal giving a 4.4 percent improvement in Haugh unit score. These differences were not great enough, however, to offset the wide variation in changes observed between individual eggs within the same group.

Yolk Weight

No significant changes were observed in any of the treatment groups.

Albumen Weight

No treatment differed significantly from the control group. But the eggs produced by the hens without water were significantly different from those laid by the hens receiving-no feed for the entire period or no feed for the first 12 hours. The eggs from the no-water treatment had 6.7 percent less albumen, whereas those produced on the full-term feed removal treatment showed a 4.9 percent increase in albumen weight.

Shell Weight and Shell Thickness

These measurements revealed the most **dramatic** effects of the various treatments. No feed for the entire period resulted in a 24.9 percent reduction in shell weight and a 25.1 percent reduction in shell thickness. Both changes were highly significant.

Feed removal for the first 12 hours resulted in a significant 10.8 percent decrease in shell weight but a nonsignificant 12.3 percent decrease in shell thickness.

The 25.1 percent reduction in shell thickness, due to removal of feed for 25 hours, would be comparable to a drop in shell thickness from .0140 inches to .0105 inches. This much of a loss in shell quality would result in an extremely high proportion of cracked eggs.

Table 1. Changes in selected egg characteristics following feed or water removal*

Trait	Treatment				
	Feed & water full-term	No feed full-term	No feed 1st 12 hrs	No feed after 12 hrs	No water full-term
	-- percent change --				
Egg weight	0a**	-2.8ab	1.9a	-2.6ab	-9.2b
Albumen height	Oa	7.7a	1.8a	4.0a	-5.3a
Haugh units	Oa	4.4a	1.6a	2.8a	-.6a
Yolk weight	Oa	-8.7a	2.3a	-4.8a	-14.2a
Albumen weight	Oab	4.9a	4.4a	-1.4ab	-6.7b
Shell weight	Oab	-24.9d	-10.8c	-1.9ac	-7.9bcd
Shell thickness	Oa	-25.1b	-12.3a	-2.3a	-6.0a
	-- Hours following first egg --				
Time 2nd egg laid	25.4a	25.0a	26.3a	26.2a	26.9a

* Adjusted to correct for changes which occurred in the control group.

** Means with different small letters were significantly different ($P < 0.05$).

Shells of this thickness cannot be handled without considerable breakage. **Twenty-four** hour water removal reduced shell weight by 7.9 percent, but results were too variable to prove significance.

Time of Lay

On the average, the second egg was laid 25.4 hours following the first egg. No treatment resulted in a time interval significantly different from this. The hens without feed for the entire period laid their second egg at 25.0 hours, whereas the hens without water for the entire period laid their second egg **at 26.9 hours**. With more hens in the experiment, these differences might have been significant.

DISCUSSION

These experiments demonstrate the very rapid response of the chicken to deprivation of feed or water. Such deprivation can occur in **many ways** on commercial farms. Frozen watering systems, **broken-down** feeders, and temporary shortages of feed are all causes of these problems. The more obvious results will be a decrease in egg size and an increase in egg breakage.

Feed removal results in an almost immediate deficiency of several nutrients which are vitally needed for daily production. Water removal has the same effect because without water, feed consumption is reduced to sub-optimal levels. Probably the most important of these deficiencies, on a short-term basis, is a lack of calcium. Removal of calcium alone from a ration will cause responses very similar to those we observed.

SUMMARY

Eggs laid over a 2-day period by 44 individually caged Leghorn hens were collected and measured for selected characteristics. Following initial oviposition, hens were either kept on full feed and water or placed on one of four feed or water restriction regimes **until the** second egg was laid on the following day.

No feed for the entire period resulted in a 25 percent reduction in shell weight and thickness. Egg weight was reduced by an equivalent of 2.2 ounces per dozen when water was unavailable. There were no significant treatment effects on albumen quality, albumen or yolk weight, and time interval between first and second eggs.

Selected References

- Adams, A.W., 1973. Consequences of depriving laying hens of water a short time. Poultry Science 52: 1221-1223.
- Bierer, B.W., T.H. Eleazer and D.E. Roebuck, 1965. Effects of feed and water deprivation on chickens, turkeys and laboratory animals. Poultry Science 44: 768-773.
- Bierer, B.W., T.H. Eleazer and D.E. Roebuck, 1965. Effect of feed and water deprivation on chickens of various ages. Poultry Science 44: 1351.
- Douglas, C.R., R.H. Harms and W.G. Nesbeth, 1975. Egg production of laying hens as influenced by length of time without feed. Poultry Science 54: 1754-1755.
- Joski, H.C. and R.P. Link, 1971. A study of chickens during water deprivation. Poultry Science 50: 1532-1534.

###

This is the first issue of Progress in Poultry (PIP), a new publication designed to report results of **research projects** conducted by Cooperative Extension personnel working in the area of production and marketing of eggs and poultry. Issues will be consecutively numbered and dated, but no rigid publication schedule will be followed. Releases will be made as reports become available. **Normally, each issue** will cover the results of a single project.

Distribution of PIP will be made to industry leaders and fellow researchers. Anyone wishing to be placed on the mailing list may send a request to the editor.

Milo H. Swanson
Editor, Progress in Poultry
Cooperative Extension
University of California
Riverside, CA 92502