say that our view of the former was no less clear and convincing than is our daily view of the latter.

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## THE INCREASE IN THE CALCIUM OF HENS' BLOOD ACCOMPANYING EGG PRODUCTION[1]

IN connection with our work on the influence of ultraviolet light on egg production we have had occasion to determine the calcium content of the blood of a fairly large number of normal laying hens. Pre-chickens ranging in age from day-old chicks to mature laying pullets. Determinations were also made on the blood of some mature hens which were out of production because of the molting period. Other determinations were made on blood of hens that had passed through the molting period and had come into production. The determinations were made by a slightly modified Kramer-Tisdall method. The summary of the results obtained are shown in the accompanying table:

These results show quite clearly that the calcium content of the blood of hens during the period of egg production is about double that during the periods of non-production.

| Age | No. of birds | Condition | Mg Ca per 100 cc of plasma | | |
|---|---|---|---|---|---|
| | | | High | Low | Average |
| 1 day | 25 | | Blood pooled | | 12 |
| 1 mo. | 6 | | Blood pooled | | 12 |
| 2 mo. | 6 | | Blood pooled | | 13 |
| 3 mo. | 6 | | Blood pooled | | 13 |
| 4 mo. | 6 | | Blood pooled | | 14 |
| 5 mo. | 10 | Immature pullets | 15 | 12 | 13 |
| 5 mo. | 10 | Mature pullets not in production | 25 | 15 | 20 |
| 5 mo. | 10 | Mature pullets in production | 34 | 25 | 27 |
| 7 mo. | 3 | Capons | 13 | 13 | 13 |
| 7 mo. | 10 | Mature cockerels | 15 | 13 | 14 |
| 18 mo. | 10 | Molting hens not in production | 18 | 11 | 14 |
| 18 mo. | 3 | Mature hens after molting in production | 35 | 29 | 31 |

vious experiments had shown that the amount of calcium and inorganic phosphorus in the blood of normal growing chicks was quite uniform and about the same as that of other normal animals. From this we expected to find a similar uniformity in the calcium content of the blood of mature hens. Instead of this uniformity, however, we found surprisingly great variations in the calcium content of their blood. In a lot of ten hens we found values ranging from 13 mg per 100 cc of blood to 32 mg per 10 cc. Trap-nest records were not available on these hens, so an absolute correlation of the blood calcium and egg production could not be made. It appeared, however, that the variation in the calcium content of the blood was due to the variation in egg production. The high values were obtained in the case of the hens which were in production and the low values from hens which appeared as if they were not in production.

In order to obtain reliable information on the relation of egg production to the calcium content of the blood, a series of determinations was made this year on the calcium content of the blood from normal

[1] Contribution No. 129, Department of Chemistry, Kansas State Agricultural College.

During the time this work was under way Riddell and Rheinhart[2] published the report of their work showing that there was a marked rise in blood calcium in pigeons at the time of egg production. The results of our work agree with theirs both in the fact that egg production is accompanied by a large increase of blood calcium and also in the fact that there is no increase in the blood calcium in male birds accompanying sexual maturity.

The increase in the blood calcium of the laying hen seems to be due to the same interplay of hormones that bring about the development of secondary sexual characteristics. At least the increase in blood calcium and the development of the characteristics by which egg production may be judged parallel each other, so that one can easily select a high or low blood calcium hen by observing these characteristics. Work is now under way to determine the relation of activity of the parathyroids to the increase of blood calcium.

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[2] *American Journal of Physiology*, Vol. 74.