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## Temperature Regulation in Baby Chicks.

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At environmental temperatures below 25° C. baby chicks of one to 3 weeks of age huddle together when they are not eating. This procedure may decrease their loss of heat and is then to be regarded as a type of temperature regulation. As it would be a matter of a higher biological unit than the single animal, it could be classified as social temperature regulation. It would be superimposed on the individual regulation, within which Rubner distinguished the chemical regulation at low and the physical regulation at high environmental temperatures. The social temperature regulation would be physical in its nature but effective only at low environmental temperatures, that is, in the realm of the chemical regulation.

In order to determine whether such a possible influence really exists, the fasting metabolism (24 to 36 hours after the last feed) of baby chicks was determined in groups of 10 individuals, which were allowed to come together in one trial and were separated by divisions of chicken wire in the next trial. With another group, the test was first made with the chicks separated, and was followed by the trial during which they were allowed to huddle together. At an environmental temperature of 14°-15° C., both groups showed a reduction of the metabolism of 15% as a result of huddling.

In similar experiments conducted at a high environmental temperature (37.8° C.) however, the baby chicks have an even higher fasting metabolism when they are allowed to come together than when they are separated. This is shown in Table I, where the heat

TABLE I.
Influence of Huddling on Metabolism of Baby Chicks

| Air Temperature °C | No. of Chicks per group | Age of Chicks days | | Body weight $W.\ 10^3$ (gm.) | | Heat Production Calories per $W^{3/4}$ | | Together in % of Separated |
|---|---|---|---|---|---|---|---|---|
| | | Separated | Together | Separated | Together | Separated | Together | |
| 37.8 | 10 | 19 | 17 | 84.2 | 79.9 | 90 | 94 | 104 |
| " | 10 | 18 | 20 | 47.6 | 47.5 | 77 | 86 | 112 |
| 21 | 5 | 21 | 23 | 107.3 | 110.1 | 144 | 131 | 91 |
| " | 5 | 22 | 20 | 101.4 | 96.1 | 149 | 141 | 95 |
| " | 5 | 18 | 16 | 87.9 | 89.2 | 148 | 146 | 98 |
| 15.5 | 10 | 22 | 20 | 116.3 | 117.0 | 179 | 151 | 85 |
| 13.9 | 10 | 19 | 21 | 105.6 | 102.4 | 194 | 166 | 86 |

production determined in 12 hours during the night is calculated per 24 hours and per unit of the three-fourths power of the average body weight.

These last experiments are in agreement with the studies of Benedict and coworkers on the influence of huddling on the metabolism as a possible source of error in respiration trials with groups of animals. They conclude that huddling together does not affect the heat production of mice or rats[1] or sheep.[2] These animals seem to have been tested above their critical temperatures, where they produce more heat than they need for maintaining their body temperatures, and where, consequently, a reduction of the metabolism by social temperature regulation cannot be expected.

Our experiments indicate that huddling together may be a means of saving energy at low environmental temperatures.

[1] Benedict, F. G., and Fox, E. L., *Pflüger's Arch.*, 1933, **231**, 470.

[2] Benedict, F. G., and Ritzman, E. G., *Arch. für Tierernährung und Tierzucht.*, 1931, **5**, 60.