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How to measure locomotor activiy in 'lazy' chickens

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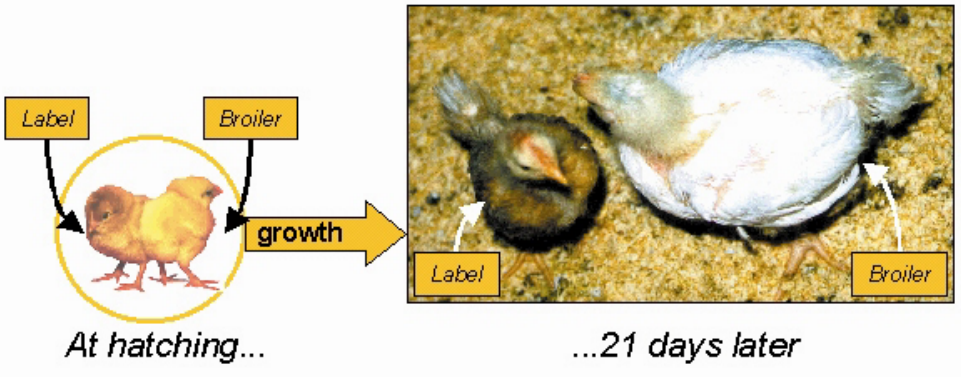
Using The Observer for Animal Behavior Research

Meat-type chickens show low levels of activity, in particular they walk very little. In addition, chickens weighing only 40 g when hatched increase their body weight to 2300 g in only 6 weeks. The lack of physical exercise combined with the high growth rate has enormous effects on the development of the musculo-skeletal system and causes poor skeletal quality. The high incidence of resulting leg problems causes commercial production losses and considerable animal welfare problems. Some studies have shown that increasing locomotion in meat-type chickens using environmental factors, for example by increasing the distance between feeders and drinkers, can improve bone quality [2]. However, the question remains whether these chickens are not genetically predisposed to low locomotor activity, because of the genetic selection for higher growth rate. To answer this question, we compared the early spontaneous activity of two genetic strains of chicken, which differed considerably in growth rate: a fast growing genetic stock (Broiler, slaughter age = 6 weeks, high incidence of leg problems, commonly used in meat production) and a slow growing genetic stock (Label, slaughter age = 12 weeks, no leg problems).



Methodological problems

Chickens stand only for 10 to 20 % of the time [1]. In addition, walking and running only occur in short bouts of several seconds and these relatively rare events depend mainly on the motivation for the displacement (i.e. eating, drinking). Thus we need detailed measures and descriptions of spontaneous activities, especially when the animals are standing. We therefore chose to observe chickens during standing periods using continuous recording with the Focal Sampling option of The Observer. This allowed us to easily maximize quantity and quality of information. Time budgets were also measured by Scan Sampling in order to establish the time spent active overall.

Methods

Measuring chicken activity

Six 2 m2 pens each containing 5 male birds were used for each genetic strain (Label and Broiler). At 0, 1, 2 and 3 weeks of age, an observer sat 2 m above the birds and 50 cm back and recorded all behavioral patterns during "standing bouts" on a laptop (from the moment when a bird stood up until it lay down). The first bird to stand was chosen as a "single actor" and all the activities it expressed were recorded with a time resolution of 0.1 s (number of steps and time spent walking, drinking, eating, foraging litter, standing idle, running, sitting, preening). About 20 standing bouts were recorded per pen and age. In total, 836 Observer files were analyzed using the Elementary Statistics option of The Observer, after which the results were transferred to Excel. Standing bouts were then sorted into two types: "feeding bouts" during which chicks drank or ate and "non-feeding bouts". These two types of bouts

were analyzed separately, because the motivation to be active is believed to be different in each type of bout. The results presented below only concern "feeding bouts".

Time budget by scan sampling

The time budget of all birds was established at 1, 8, 15 and 17 days of age by counting the number of chicks walking, standing idle, eating, drinking and lying. Each pen floor was scanned every two minutes for 90 minutes. This method requires only paper and a pencil.

Results

Strain effect on activities during feeding bouts

Feeding bouts represented 21% of the bouts recorded and 74% of the total time observed. Time spent walking, eating, standing idle and especially time spent foraging litter were significantly higher in Label chicks than in Broiler chicks (Mann Whitney U test, figure 1). Although chick body weight was very similar in both strains during the first days of life, duration of walking, standing and the number of steps taken by Broiler birds were half of those of Label chicks at the age of 2 and 3 days, suggesting a genetic stock effect (figure 2).

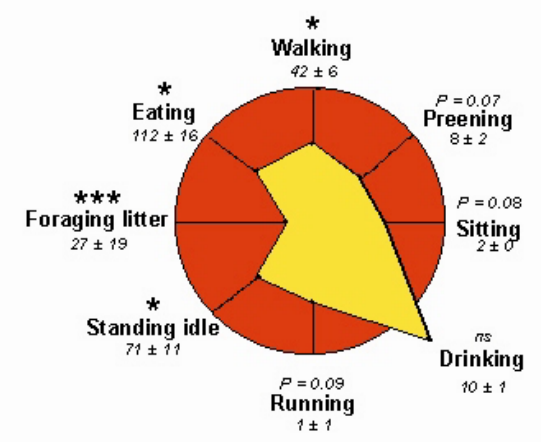


Figure 1. Comparison of activities during feeding bouts of both genetics types. Polygon surface (yellow) shows activity of Broilers in relation to Label activity. Label activity corresponds to 100% and is located on the circle perimeter (red). Each vertex illustrates mean duration of Broiler activity compared to that of Label animals. Figures indicated under each behaviour are mean +/- standard error(s) of Label birds. Probabilities indicate the type effect (:P<0.05; ***;P<0.001).*

Strain effect on time budget

When all groups were combined, chicks spent 67% of the time lying, 28% of the time active immobile (eating , drinking and standing idle) and only 5% of the time walking. Walking time did not significantly differ between strains, even during the first days of life.

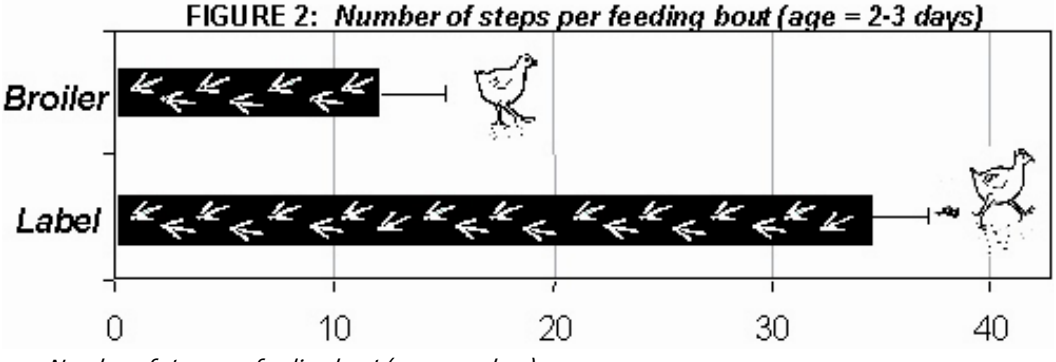


Figure 2. Number of steps per feeding bout (age = 2-3 days)

Conclusions

Differences in locomotion between genetic strains were observed in the first days of life with focal sampling, but not with scan sampling. This suggests that the observation of standing bouts with focal sampling is more effective and precise than scan sampling to study the time spent walking. Moreover, observing one individual continuously during a sustained period of activity allowed us to study locomotor motivation and the structure activity periods, for instance by studying the typology of standing bouts. Future experiments using The Observer will try to provide more insight into the intrinsic organization of the small amount of time spent awake in chickens, and will study how to stimulate locomotor behavior.

These results were published in Applied Animal Behaviour Science (Bizeray et al. (2000). 68, 231-242)

References

1. Bessei, W. (1992). Das Verhalten von Broilern unter intensiven Haltungsbedingungen. *Archiv für Geflügelkunde*. **56**, 1-7.
2. Reiter, K.; Bessei, W. (1996). Effect of the distance between feeder and drinker on behaviour and leg disorders of broilers. *Paper presented at the 30th ISAE International Congress*. Guelph. pp. 131.

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