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## Body Composition of Cows Kept under Tropical Conditions — Carry-Over Effects of Feed Fluctuation

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### Abstract

Knowledge of composition of fat, protein and water in the body is indicative for the determination of effects of changes in nutrition in terms of body reserves. Deuterium oxide dilution technique has been proposed as easy, reliable and non-destructive method of determining body composition using the ratios of protein:water and mineral:water to predict fat.

Twenty *Bos indicus* (Boran) and 21 Boran × Holstein have been exposed for 4 years to calculated energy requirements for maintenance (M) (low) or M<sup>+</sup> 20% (medium) and M<sup>+</sup> 40% (high). In the third lactation these treatments were sub-divided into either low or high feeding level. Before deuterium application animals were weighed and a blood sample was collected from the jugular vein. Deuterium was slowly administered at 0.3 g/kg fasted body weight, directly into the jugular vein and the syringe was rinsed with refilled blood. Blood samples were taken at 5, 7, and 9 h post infusion and deuterium concentrations in plasma were analysed using isotope mass spectroscopy (3960 nm against water). The gastrointestinal tract (GIT) of the cows was assumed to amount to 0.20 of body weight (BW), and empty body weight (EBW) was described as EBW = BW – GIT. Body composition was estimated in the following equations:

$$\text{Empty body water (kg)} = 0.4717 \times \text{BW (kg)} + 0.1536 \times \text{D}_2\text{O-space (kg)} - 25.046$$

$$\text{Empty body ash (kg)} = 0.0363 \times \text{BW (kg)} + 0.0231 \times \text{D}_2\text{O-space (kg)} - 5.755$$

$$\text{Empty body protein (kg)} = 0.1624 \times \text{BW (kg)} + 0.0165 \times \text{D}_2\text{O-space (kg)} - 11.488$$

$$\text{Empty body fat (kg)} = 0.3790 \times \text{BW (kg)} - 0.2955 \times \text{D}_2\text{O-space (kg)} - 42.163$$

Previous feeding level and the genotype explained most of the differences between treatment groups. Boran cows showed higher levels of fat, but the difference of 20% and 40% of the previous medium and high treatment was still visible. Fat reserves from the cross-bred cows were strongly influenced by milk production, however, crossbreds previously on low plane of nutrition replenished their fat deposits instead of producing more milk when receiving higher amounts of feed.

**Keywords:** Body composition, carry over, deuterium, undernutrition, zebu