# Prediction of live-weight from linear body measurements in Iranian buffaloes

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**Introduction** Determining the live weight of domestic animals is necessary for management practices such as ration formulation, drugs administration, recording for breeding and genetic improvement. Weighing is often difficult in large animals such as cattle and buffalo, where many farms do not have complete restraint and handling systems, and few have equipment to determine body weights. Therefore, equations to estimate body weight from other body measurements, which have a high correlation with body weight, are needed. Bassano *et. al.* (2001) reported the use of linear body measurements to estimate body weight of Alpine Ibex. These equations would be useful when weighing facilities are not available. The objective of this investigation was to find regression equations to predict live-weight from body measurements for Iranian buffaloes.

**Material and methods** Data were collected from two groups of animals. Most measurements were made on the livestock research farm of Safiabad from 80 buffaloes over 5 years and the remainder (100 buffalo) were collected from of commercial farms in Khuzestan, Iran. Body weight (BW) was measured using a weighbridge and the following linear body measurements using a tape measure. Body length (BL) was measured as the distance from the external occipital protuberance to the tail base. Height–at–withers (HW) was measured as the distance from the ground level to the withers and heart girth (HG) represented the circumference of the chest just behind the forelimbs. Data collected were classified based on sex and age. Mean ± SE for body weight and linear body measurements (BL, HW and HG) were calculated. The relationships between bodyweight and linear body measurements were estimated by Pearson correlation. Regressions of body weight on HG, HW and BL utilizing individual observations were performed. Linear, quadratic, power and cubic effects of the independent variables were considered. To indicate the accuracy of linear measurement of the predictive equation, we used the coefficient of determination ($R^2$). Statistical analyses were performed by using SPSS statistics program.

**Results** The mean body weight of buffalo males and females were observed as 281.5 ± 4.9 and 295.4 ± 4.7 kg, respectively. The mean body length of males was found to be 1.22 ± 0.01 m while that of females was 1.21 ± 0.01 m. The mean height-at-withers in males was 1.18 ± 0.005 m while that of females was 1.17 ± 0.004 m. Mean heart girth in males was 1.45 ± 0.01 m and in females 1.49 ± 0.01 m. Body weight was correlated with body length (males and females: 0.95), height-at-withers (males: 0.92, females: 0.93) and hearth girth (males and females: 0.97), respectively. The correlation coefficients between body weight and all body measurements were high but heart girth was found to be the measurement most closely related to live-weight. After comparing different regression equations of body weight on heart girth, the equations below estimated buffalo body weight (kg) from heart girth (cm) with the highest $R^2$. Suggested equations differed between buffalo males and females significantly ($p<0.0001$) using general linear model and contrast procedure of SAS.

Males
Birth to 1 year old: Weight = 80.352 (Heart girth) $^{2.959}$ , $R^2$= 99.1%
1 year old and above: Weight = -755.929 + 676.1 (Heart girth) , $R^2$= 97%
Females
Birth to 1 year old: Weight = 79.627 (Heart girth) $^{2.942}$ , $R^2$= 99.1%
1 year old and above: Weight = -642.061 + 601.5 (Heart girth) , $R^2$= 96.6%
Both sex
Birth to 1 year old: Weight = 79.984 (Heart girth) $^{2.949}$ , $R^2$= 99.1%
1 year old and above: Weight = -670.831 + 621.4 (Heart girth) , $R^2$= 96.2%

**Conclusion** The high correlation between body weight and heart girth would imply that live weight could be predicted fairly accurately from heart girth. Heinrichs *et. al*. (1992), reported the highest $R^2$ for the regression of body weight on heart girth ($R^2<0.95$) in investigation of body measurement of Holstein heifers. Özluturk *et. al*. (2006) concluded that the models including heart girth alone could be used to predict precisely body weights of Eastern Anatolian Red cattle .On the basis of these equations, we can design and produce a weight tape which can used as a simple tool to estimate buffalo weight by farmers, buffalo feed and breeding expertise, veterinarians.

**References**

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