

Predicting beef carcass retail products of Mediterranean buffaloes by real-time ultrasound measures

A. Mendes Jorge, C. Andrighetto, C. De Lima Francisco,
Â. Polizel Neto, R. De Castro Mourão, W. Bianchini,
É. Rodrigues, A. De Amorim Ramos

São Paulo State University-School of Veterinary Medicine and Animal Science-Animal Production Department. 18618-000 Botucatu - São Paulo, Brazil. CP: 560

Corresponding author: A. Mendes Jorge. São Paulo State University-School of Veterinary Medicine and Animal Science-Animal Production Department. 18618-000 Botucatu, Brazil. CP: 560 - Tel. 55 14 3811-7185 - Fax: 55 14 3811-7189 - Email: andrejorge@fmvz.unesp.br

ABSTRACT: Twenty eight Mediterranean buffaloes bulls were scanned with real-time ultrasound (RTU), slaughtered, and fabricated into retail cuts to determine the potential for ultrasound measures to predict carcass retail yield. Ultrasound measures of fat thickness, ribeye area and rump fat thickness were recorded three to five days prior to slaughter. Carcass measurements were taken, and one side of each carcass was fabricated into retail cuts. Stepwise regression analysis was used to compare possible models for prediction of either kilograms or percent retail product from carcass measurements and ultrasound measures. Results indicate that possible prediction models for percent or kilograms of retail products using RTU measures were similar in their predictive power and accuracy when compared to models derived from carcass measurements. Both fat thickness and ribeye area were over-predicted when measured ultrasonically compared to measurements taken on the carcass in the cooler. The mean absolute differences for both traits are larger than the mean differences, indicating that some images were interpreted to be larger and some smaller than actual carcass measurements. Ultrasound measurements of REA and FT had positive correlations with carcass measures of the same traits ($r=.96$ for REA and $r=.99$ for FT). Standard errors of prediction currently are being used as the standard to certify ultrasound technicians for accuracy. Regression equations using live weight (LW), rib eye area (REAU) and subcutaneous fat thickness (FTU) between 12th and 13th ribs and also over the biceps femoris muscle (FTP8) by ultrasound explained 95% of the variation in the hot carcass weight when measure immediately before slaughter.

Key words: Mediterranean buffaloes, Carcass retail cut, Ultrasound evaluation.

INTRODUCTION - Previous studies have show that real-time ultrasound provides accurate measures of live animal fat thickness and *longissimus* muscle area (Faulkner et al., 1990; Herring et al., 1994) and has some possibilites in predicting carcass composition (Hamlin et al., 1995; May et al., 2000). Consumer demand for a leaner end product and the

move toward value based marketing has underlined the importance for beef producers to be concerned about the final products they produce (Greiner et al., 2003). Ultrasonic measurements offer beef producers another tool for making genetic progress in carcass traits. The objective of this study was to determine the efficacy of using real-time ultrasound measurements to predict retail product in beef carcass of Mediterranean buffaloes (*Bubalus bubalis*). Additionally, development of carcass retail product prediction equations applicable to the live animal would add another level of capability to genetic evaluation.

MATERIAL AND METHODS - Twenty eight young Mediterranean buffalo bulls, with average shrunk body weight of 330 kg and 14 months of age, were fed by 120 days with 70% of concentrate diet in this study.

Animals were measured three to five days prior to slaughter using a PieMedical Scanner 200 Vet equipment, with linear array transducer of 178 mm coupled with standoff guide. The first was a cross-sectional image using a wave guide taken between the 12th and 13th ribs to measure external fat thickness (FTU) and ribeye area (REAU). Rump fat (FTP8U) measurements were taken at the Aus Meat P8 site over the *gluteus medius* muscle on the rump. Buffaloes were slaughtered at a commercial packing facility and routine carcass measures were taken 24 hours postmortem. One side of each carcass was fabricated into boneless retail cuts. Retail product was calculated and expressed as a percentage of carcass weight or as total kilograms. The best equations to predict weight (PPCTE) and percentage (RPCTE) of hindquarter retail product as a function of ultrasound measures were selected through the Cp statistics. Accuracy between carcass traits and ultrasound measures were examined using absolute standard deviations and frequency distributions.

RESULTS AND CONCLUSIONS - Table 1 list the means, standard deviations, and minimum and maximum values for live animal and carcass traits. The homogeneity of the breed group used in this study resulted in a little deal of variation in carcass and live ani-

Table 1. Means, standard deviations, minimum, and maximum values for live animal, carcass, and ultrasound measures.

Trait	Mean (std. dev.)	Minimum	Maximum
Live weight, kg	496.18 (38.56)	426.00	552.00
Carcass weight, kg	246.18 (20.92)	208.50	280.50
Carcass FT, mm	10.37 (3.01)	5.00	18.00
Carcass REA, cm ²	69.46 (6.82)	56.00	81.00
FTU, mm	9.92 (3.00)	5.00	17.60
REAU, cm ²	66.81 (7.04)	54.85	79.53
FTP8U, mm	11.93 (3.18)	6.30	17.80
Carcass retail product, %	74.60 (2.39)	63.51	76.55
Carcass retail product, kg	183.82 (18.27)	132.42	212.49

FT = backfat thickness; REA = ribeye area; FTU = backfat thickness by ultrasound; REAU = ribeye area by ultrasound; FTP8U = rump fat thickness at P8 site over the *gluteus medius* muscle by ultrasound.

mals traits. Ultrasound measured traits of backfat thickness (FTU) and ribeye area (REAU) had smaller deviations and less variation than the same traits measured on the carcass.

Table 2. Parameters of regression equations to predict weight (PPCTE) and percentage (RPCTE) of hindquarter retail product as a function of ultrasound measures.

Weight of Hinquarter Retail Product (PPCTE) (kg)								
Equation	C _p	r ²	S _{y,x}	Intercept	LW	REAU	FTU	EGP8U
1	3.74	0.75**	1.29	- .786	.065	.113	-	-
2	4.00	0.76**	1.26	- .939	.062	.120	.151	-
3	4.15	0.78**	1.25	-1.046	.061	.121	-	.174
Percentage of Carcass Retail Product of Pistola Style Cut (RPCTE) (%)								
Equation	C _p	r ²	S _{y,x}	Intercept	LW	REAU	FTU	EGP8U
1	3.58	0.24	2.41	63.49	-.013	.127	-	-
2	3.95	0.25	1.74	63.33	-.017	.138	.184	-
3	4.00	0.28	1.63	62.34	-.016	.139	-	.193

** P<.01 LW = live weight in the date of scanning by ultrasound; REAU = ribeye area of longissimus dorsi by ultrasound; FTU = backfat thickness of longissimus dorsi by ultrasound; EGP8U = rump fat upon biceps femoris by ultrasound. C_p = Mallows constant; S_{y,x} = standard deviation.

The weight of hindquarter retail product by ultrasound and in carcass are predict with greater magnitude than percentage of hindquarter retail product. The ultrasound measurements showed good accuracy and could be used to estimate differences among buffaloes groups, but further studies are necessary involving greater number of animals from different genetic groups of water buffaloes.

ACKNOWLEDGMENTS - The authors wish to express their gratitude to the National Council for Scientific and Technological Development (CNPq), Fundunesp and FAPESP for financing this research and to Carlos Hermann Guilherme Martins (Três Rios Farm) for supply the animals.

REFERENCES - **Faulkner, D.B.**; Parret, D.F.; Mckeith, F.K. et al. 1990. Prediction of fat cover and carcass composition from live and carcass measurements. *Journal of Animal Science*, 68:604–610. **Greiner, S.P.**; Rouse, G.H.; Wilson, D.E. et al. 2003. Predicting beef carcass retail products using real-time ultrasound and live animal measures: progress report. www.extension.iastate.edu/Pages/ansci/beefreports/asl-1327.pdf. **Hamlin, K.E.**; Green, R.D.; Cundiff, L.V. et al. 1995. Real-time ultrasonic measurement of fat thickness and longissimus muscle area: II. Relationship between realtime ultrasound measures and carcass retail yield. *Journal of Animal Science*, 73:1725–1734. **Herring, W.O.**; Williams, S.E.; Bertrand, J.K. et al. 1994. Comparison of live and carcass equations predicting percentage of cutability, retail product weight, and trimmable fat in beef cattle. *Journal of Animal Science*, 72:1107–1118. **May, S.G.**; Mies, W.L.; Edwards, J.W. Et Al. 2000. Using Live Estimates And Ultrasound Measurements To Predict beef carcass cutability. *Journal of Animal Science*, 78:1255-1261.