

## SUPPLEMENTARY MATERIAL

### **Adaptive integumentary features of beef cattle raised on afforested or non-shaded tropical pastures**

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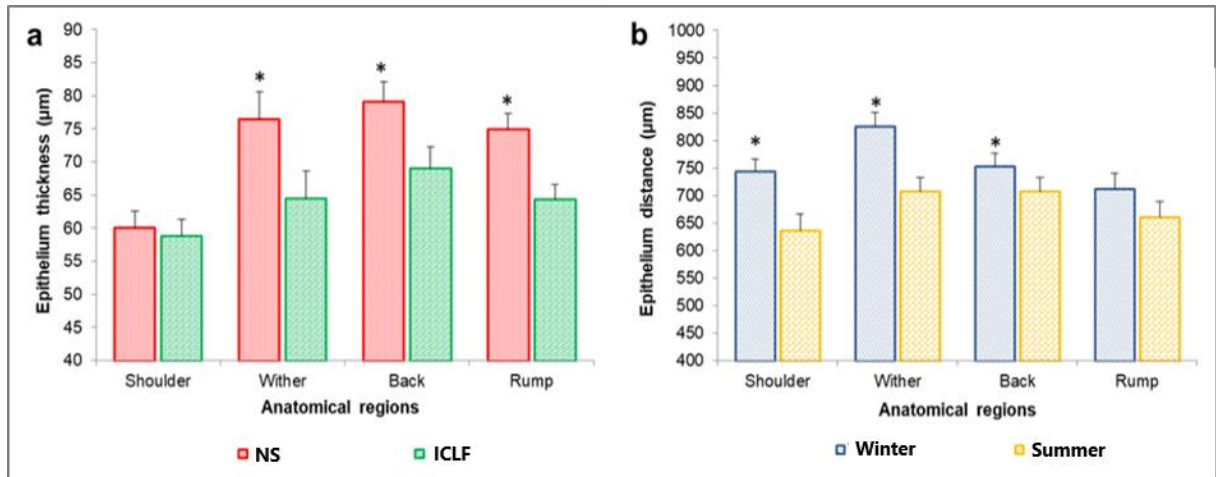
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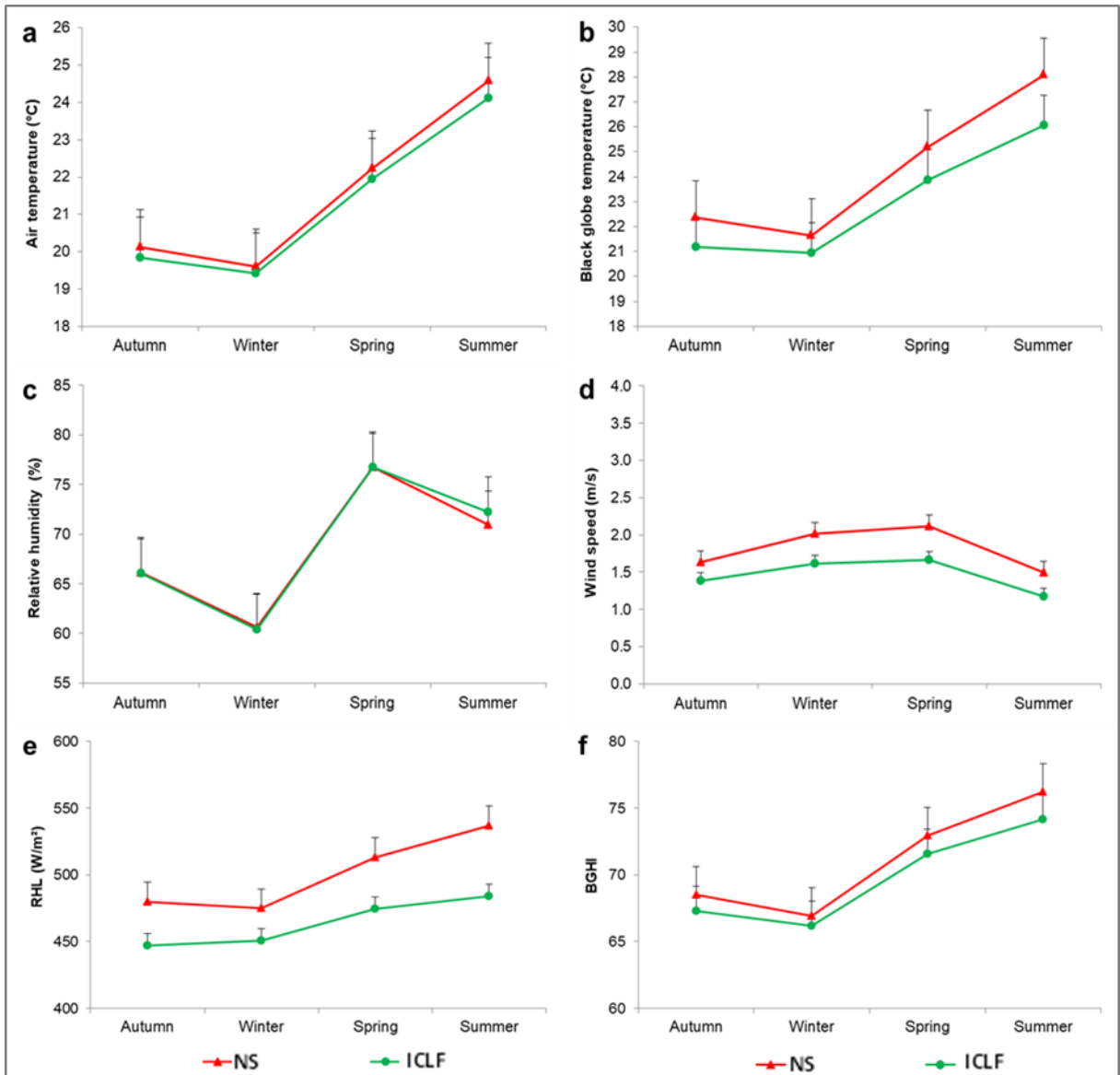
Brazilian Agricultural Research Corporation (Embrapa)

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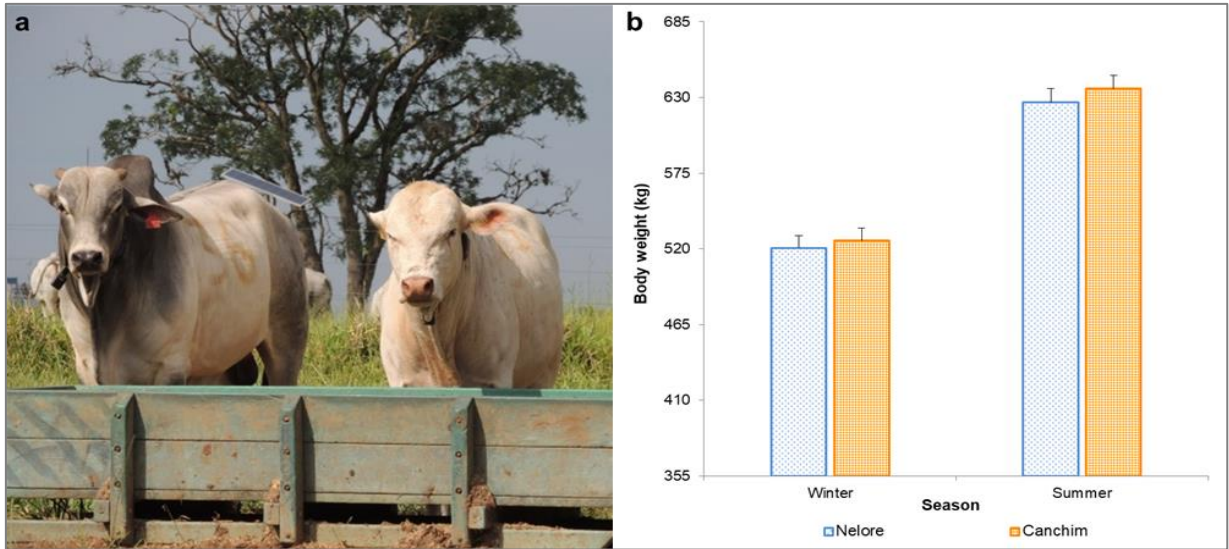
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**Supplementary Figure S1** Histomorphometric analysis of different anatomical regions of adult (n=20) Nelore (*Bos indicus*) and Canchim (5/8 *Bos taurus* × 3/8 *Bos indicus*) cattle raised on pasture in non-shaded (NS) or integrated crop-livestock-forest (ICLF) systems, in winter and summer. **(a)** Mean ( $\pm$  standard error) of epithelium thickness by production system; **(b)** mean ( $\pm$  standard error) of epithelium distance by season (The asterisks indicate  $p < 0.05$ ).



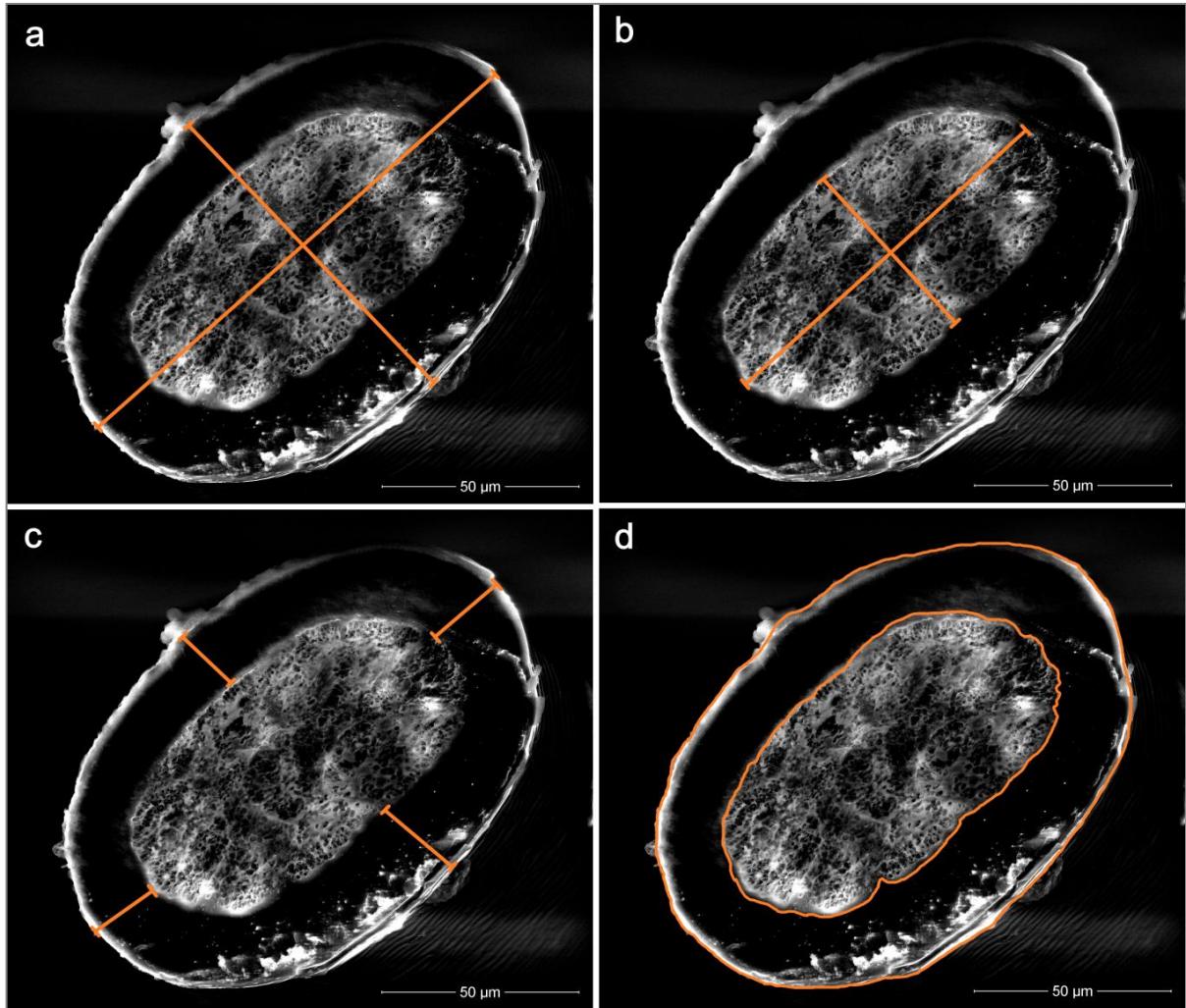
**Supplementary Figure S2** Mean ( $\pm$  standard error) (a) air temperature, (b) black globe temperature, (c) relative humidity, (d) wind speed, (e) black globe temperature and humidity index (BGHI), and (f) radiant heat load (RHL) recorded between 8 a.m. and 4 p.m. under intensive rotational grazing in non-shaded (NS) or integrated crop-livestock-forest (ICLF) systems in a tropical climate.



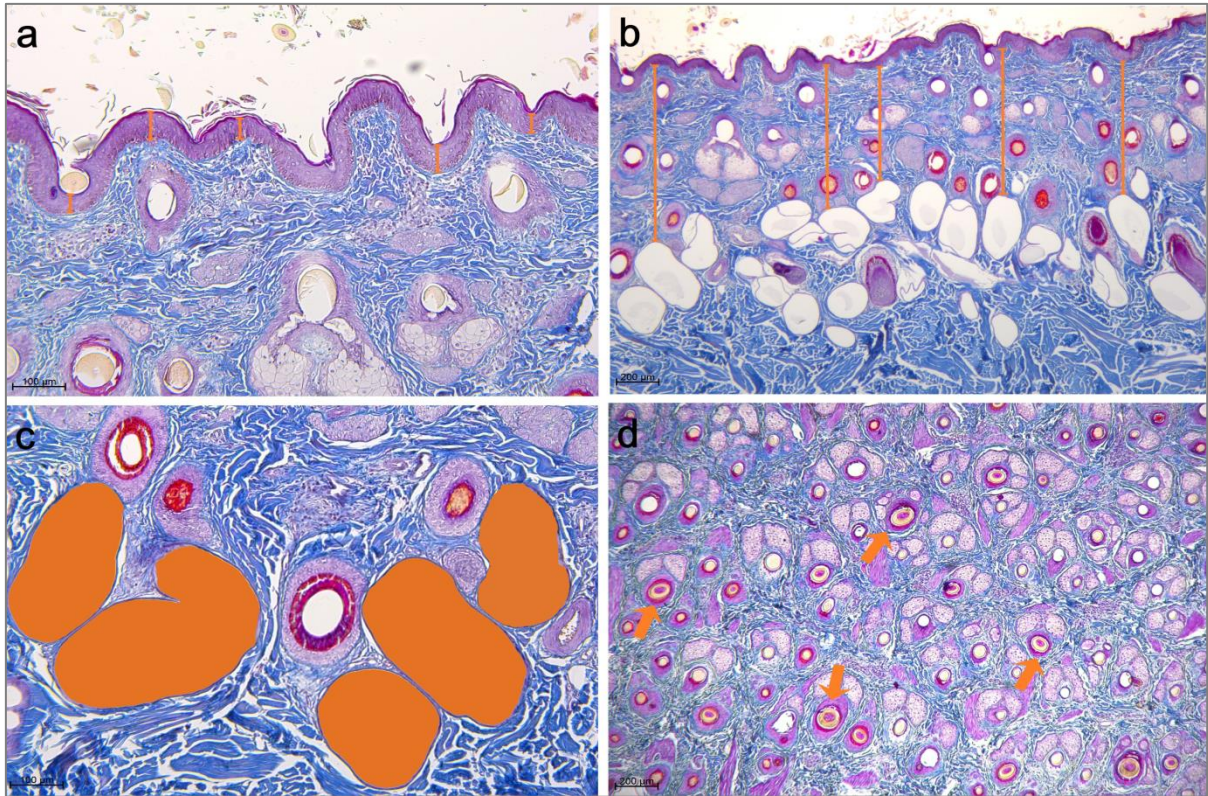
**Supplementary Figure S3** (a) Illustrative photograph of Nelore (*Bos indicus*; left) and Canchim ( $5/8$  *Bos taurus*  $\times$   $3/8$  *Bos indicus*; right) bulls, and (b) average live weight of the study animals (n=64) of both breeds in winter and summer. Bars represent the standard error of the mean.



**Supplementary Figure S4** Illustrative photograph of an experimental animal (Nelore cattle), indicating the anatomical regions used for hair collection and skin microbiopsy. The numbers in orange indicate the (1) shoulder, (2) wither, (3) back, and (4) rump regions.



**Supplementary Figure S5** Scanning electron microscopy images of a hair from an experimental bull under 2,000× magnification. The orange marks indicate the morphometric evaluations of the largest and smallest (a) hair and (b) medulla diameters, (c) cortex thickness, and (d) cortex and medulla perimeters.



**Supplementary Figure S6** Photomicrographs of skin from an experimental bull showing the histomorphometric analysis of (a) epithelium thickness, (b) epithelial distance to sweat glands, (c) sweat gland area, and (d) number of hair follicles. Orange lines and areas indicate study loci, and orange arrows indicate hair follicles.

**Supplementary Table S1** Histomorphometric variables of the integumentary system of beef cattle evaluated by brightfield microscopy.

Variable	Unit	Magnification	Number of images analyzed per animal	Number of measurements per animal
Epithelium thickness	μm	100×	24	120
Epithelium distance	μm	40×	24	120
Glandular area	μm <sup>2</sup>	100×	48	240 sweat glands
Proportion of glandular area	%	100×	48	240 sweat glands
Density of hair follicles	hairs/mm <sup>2</sup>	40×	72	Ω

Ω: Count corresponding to the total number of hair follicles observed in each image.