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Barymetric predictions of body weight in adult goats

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Context

- Body weight of livestock is a key parameter to determine actions of herd management

Reproduction

Feeding

Sales

- However, measuring weight with scales can be difficult to implement (especially when animals are grazing on plots with a difficult access)
- Barymetric methods represent an alternative as BW would be estimated from body measurements of animals
- If such methods are quite developed for cattle and horses, there is a lack of recognized formula for goat

→ **Establishing a barymetric model for goat is a real stake as many goat farm are extensive rearing system**

Material and methods :

Animal sampling protocol

- Animals came from our experimental schoolfarm « La Bouzule » near Nancy (France)
- The herd is composed of 100 Alpine goats (goats with a strong body development)
- Animals were chosen randomly in the herd but a large scale of weight was demanded (Sample from 50 -100kg)

→ 28 adult dairy goats were used for the study :

16 primiparous & 12 multiparous

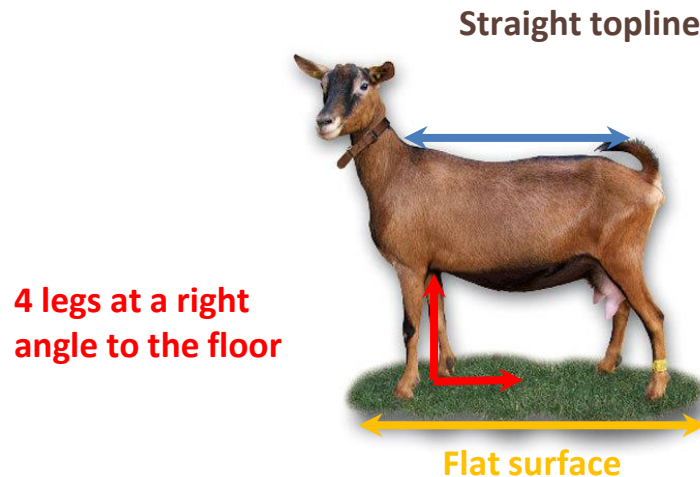
Material and methods :

Pre-experimentation and repeatability

- Goal of the pre-experimentation :
 - define BW measurements used
 - characterize variability between operators
- According to our pre-experimentation, 3 BW measurements were used:
 - height at withers (**HW**; height of the animal from the ground to withers taken at the front legs),
 - chest circumference **CC** (circumference of the animal just behind the front legs)
 - length of back **LB** (distance between the shoulder blades and the base of the tail)

Material and methods : Measurement protocol

- 3 BW measurements : **H**eight at **W**ithers, **C**hest **C**ircumference, **L**ength of **B**ack
- 2 operators : one holding, one measuring
- Every goat was weighted with a 100g precision scale
- A particular attention was paid on goat position :



Results :

Correlation between measured parameters

Pearson Test : Highlighting the level of correlation between parameters

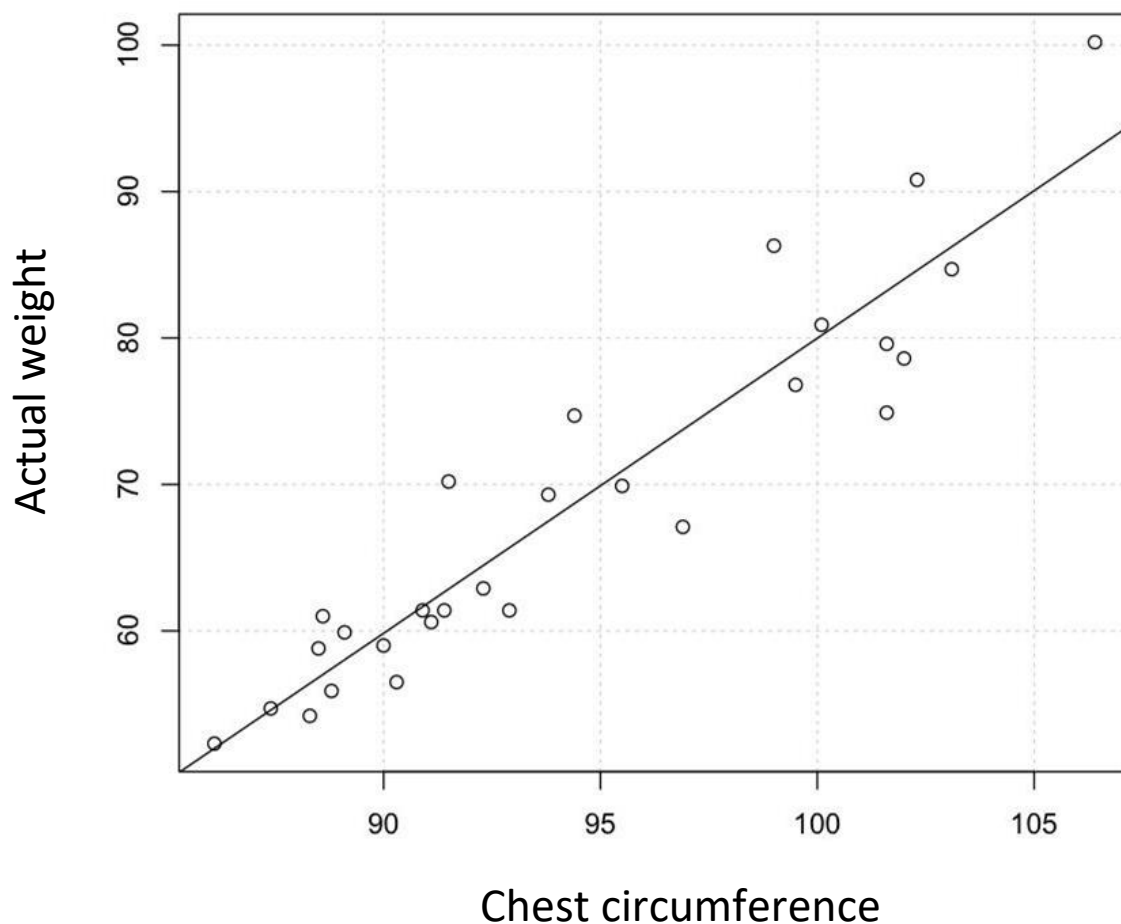
	LB	CC	HW	AC
LB	1	0.82	0.22	0.86
CC	0.00	1.00	0.19	0.94
HW	Pvalue>5%	Pvalue>5%	1	0.29
Actual weight	0.00	0.00	Pvalue>5%	1

Conclusion : 2 measurements seem to be relevant :

- CC (high correlation)
- LB (pretty redundant with CC)

Results :

Body weight prediction using chest circumference



$$BW = 2.02 CC - 121.55$$

$$R^2 = 0.88$$

$$\text{Standard deviation} = 4.34$$

- **Only one parameter to measure**
- **Good repeatability of the measure**
- **Really simple to use and time-saving model**

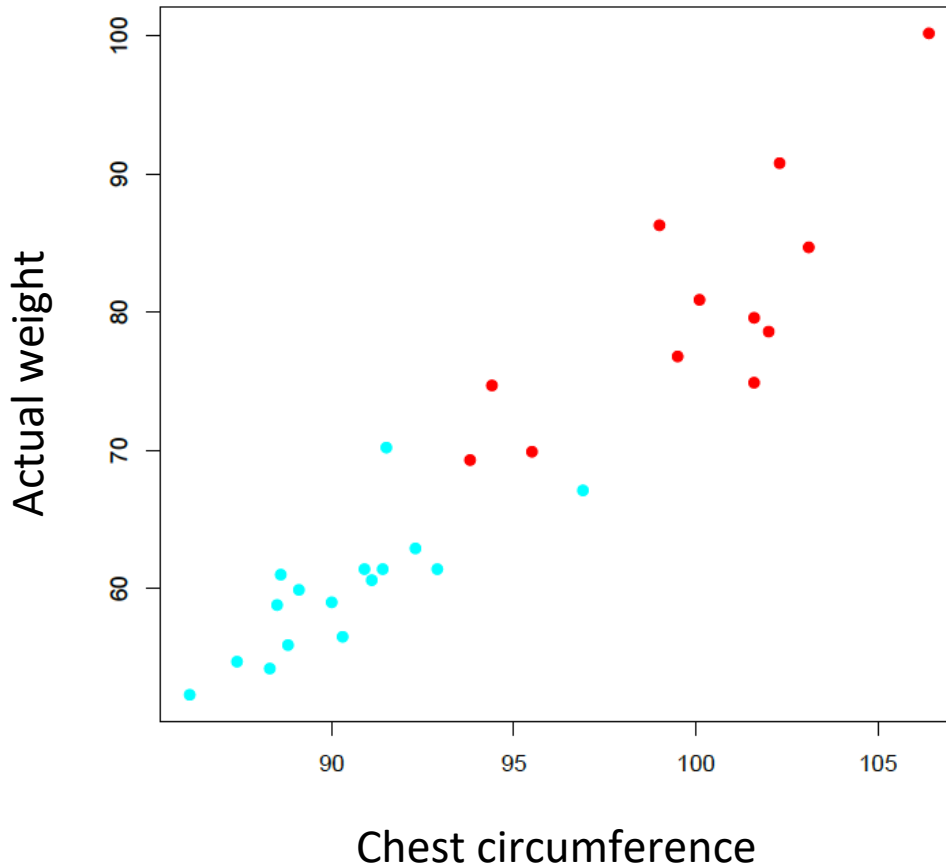
Results : Body weight prediction using chest circumference and length of back

Model	R ²	Standard deviation
$BW = 2,02 TP - 121,55$	0,88	4,34
$BW = 1.53 CC + 0.83 LB - 137.40$	0.91	3.91

- **Less uncertainty than the previous model**
- **A little more difficult to use**
- **Good repeatability of measurements**

Results :

Impact of parity on the prediction



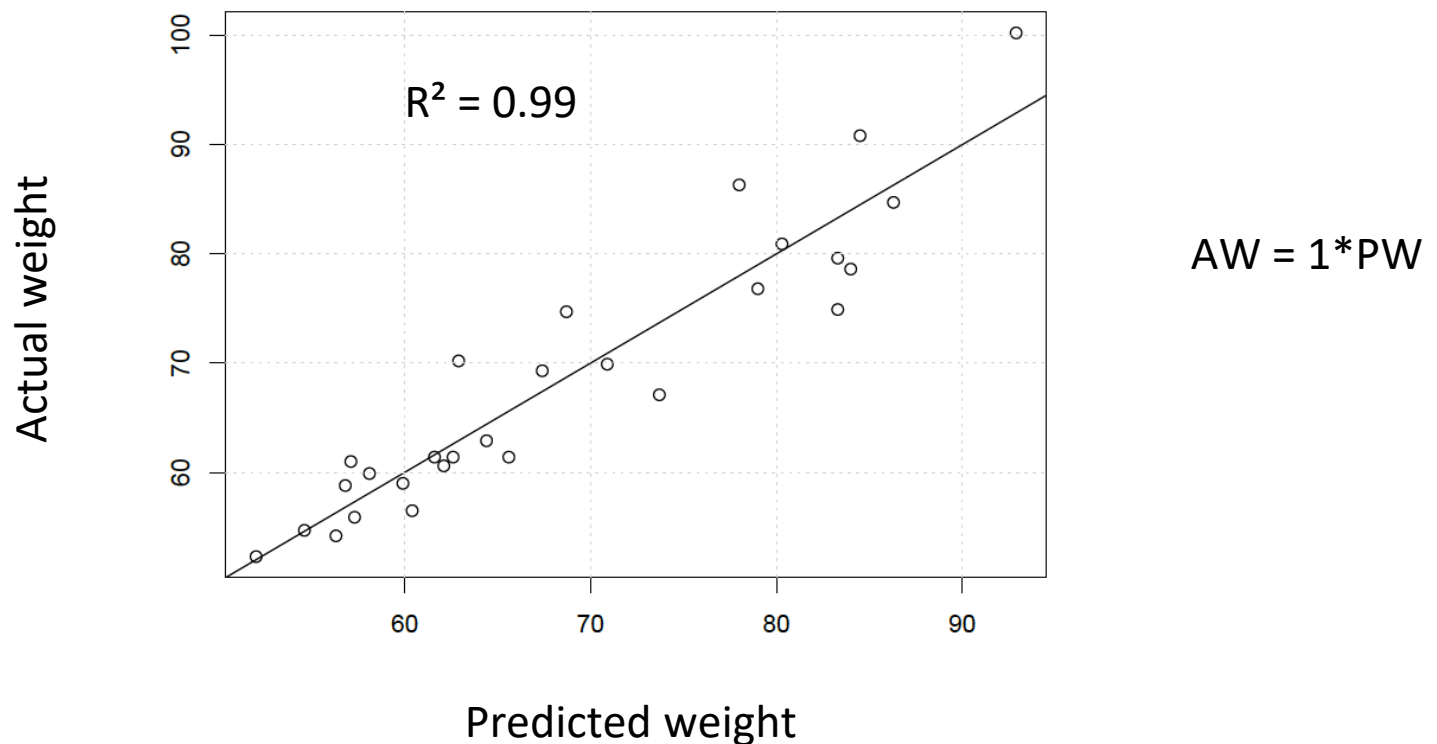
The number of parity has an impact on BW.

However, model is not affected.

→ **Model is quite robust to “support” age difference between primiparous and multiparous**

Final choice

- A simple regression seems to be enough
- Time spent on measuring LB is not justified as it slightly improve the result.



Discussion

- The uncertainty of 8.5kg (12% of BW) is a little higher than what it found on equine and bovine models (from 3 to 9% of BW)
- Preciseness of the results could not be improved with a larger sample of goat
- The efficiency of the model should be tested on other animals (less productive breeds,...) but maybe coefficients will be different and parameters unchanged
- The relevance of others parameters should be tested for other animals (volume parameter for growing animals, ...)

Conclusion

→ A good model :

→ really simple and quick to use

→ just one parameter to measure

→ suitable for a wide range of weights and breeds

→ Lack of precision but not so different from the other models (equine and bovine models)

→ A good tool for farmers with no scale or when conditions are not easy (pasture, fields with limited access)



Thank you for your attention

