

## Validation of hand-held refractometers for assessing Merino ewe colostrum and colostrum intake in lambs

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The high incidences of lamb mortality in Merino sheep remains a persistent issue for the sheepmeat and wool industry. As much as 20% of lambs born die within the first week post-partum (Horton *et al.*, 2018), and more than 17 million lambs die prior to weaning annually (Young *et al.*, 2014). One approach to reducing lamb mortality is to improve colostrum quality in Merino ewes. However, there is a need for a reliable, rapid, cost effective on-farm analytical test which can provide accurate and timely information regarding colostrum quality produced by the ewe, and subsequent colostrum intake by the lamb.

Therefore, this experiment validated the use and accuracy of two hand-held refractometers (% Total Milk Solid (TMS); and % Total Blood Proteins (TBP)) against two establish analysis techniques; radial-immunodiffusion assay to measure immunoglobulin G (IgG), and the Bradford Protein Assay to measure total proteins (TP) concentrations. Ewe colostrum ( $n=172$ ) and lamb blood samples ( $n=143$ ) were collected at 4 and 24 h post-partum.

A Pearson's correlation was performed to identify the relationship between the different analytical methods. For the 4 h colostrum samples, there was a low but significant correlation ( $P < 0.05$ ) between TMS and TP ( $R = 0.19$ ) and TMS and IgG ( $R = 0.19$ ; Figure 1). The 24 h colostrum samples showed a higher significant correlation ( $P < 0.001$ ) between TMS and IgG ( $R = 0.56$ ; Figure 2) compared to TMS and TP ( $R = 0.24$ ;  $P = 0.006$ ). Regarding colostrum intake, there was a weak, but significant ( $P < 0.02$ ), correlation between TBP and IgG ( $R = 0.18$ ) and TBP and TP ( $R=0.43$ ) in 4 h lamb serum, and a significant correlation between TBP and IgG ( $R = 0.39$ ;  $P = 0.001$ ) at 24 h.

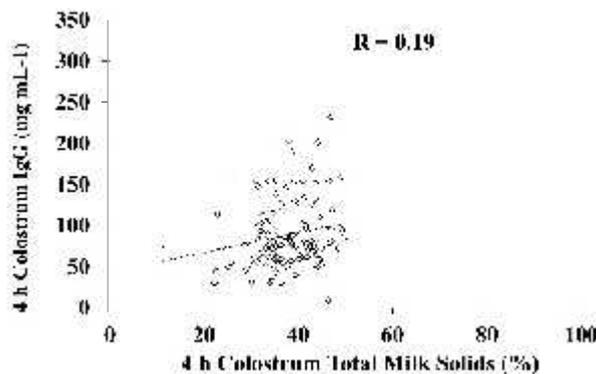


Figure 1. Correlation between total milk solids (%) and IgG concentration in 4 h ewe colostrum samples

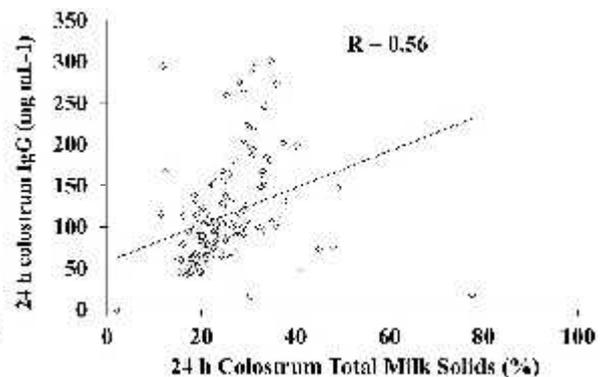


Figure 2. Correlation between total milk solids (%) and IgG concentration in 24 h ewe colostrum samples

While the use of the hand-held refractometer provided a crude measure of colostrum quality at 4 and 24 h, it was valuable in identifying high risk lambs at 24 h, as lambs with total blood protein values  $< 7\%$  did not survive to 72 h. Therefore, the use of such devices would allow for the rapid assessment of colostrum quality and intake within a breeding Merino flock.

### References

Horton, B.J., Corkrey, R., Doughty, A.K., Hinch, G.N., (2019). *Animal Production Science*, In press

Young, J., Trompf, J., Thompson, A., (2014) *Animal Production Science* 54, 645-655

*Data for this study was collected as part of a large-scale collaborative research project and was funded by Meat & Livestock Australia Limited.*