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Exploring testing strategies for colostrum intake in Scottish dairy calves

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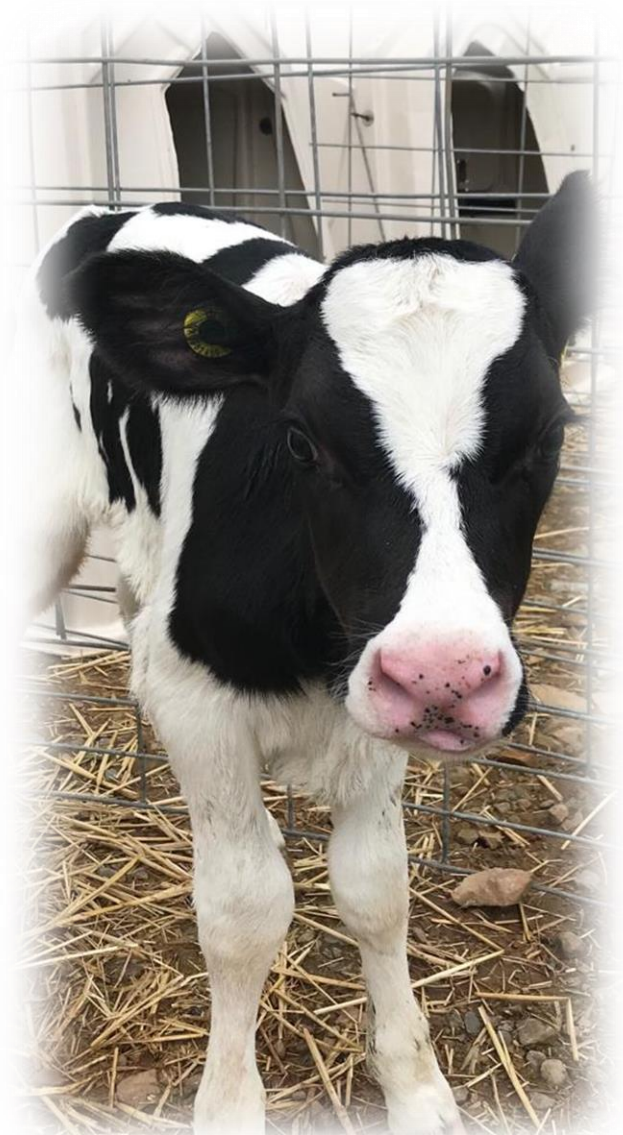
Importance of Passive Transfer

- Calves are born without antibodies - **agammaglobulinemic** and depend on antibodies from colostrum – **'passive transfer'**

- Calves with failure of passive transfer (FPT)
  - have **increased** calfhood **morbidity** and **mortality**
  - reduced **growth rates**

  lifetime performance may be affected.



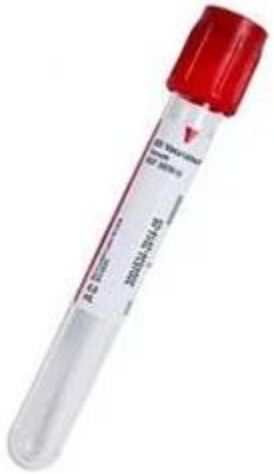
Methodology

- **38** Scottish dairy farms enrolled between **February – June 2019**
- **252 colostrum** samples taken **at the point of feeding**
- **34** farmer **questionnaires** completed about on farm **colostrum management** protocol
- **370 calves** blood sampled at **1 - 7** days of age- subjected to 4 different testing strategies

What are the current options for FPT testing?

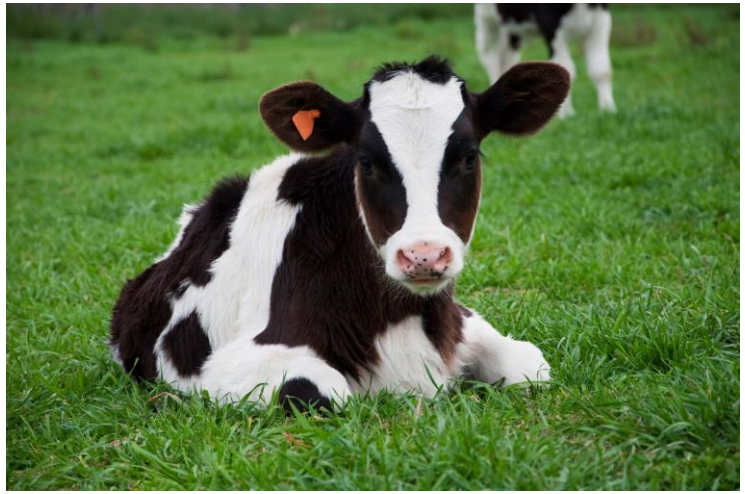
- **Direct** measurement of IgG-
  Radial immunodiffusion (RID)

- **Indirect** estimation of IgG
  - Total protein (TP)
  - Zinc sulphate turbidity (ZST)
  - Brix refractometry
  - Gamma glutamyl transferase (GGT)



These are <u>screening</u> tests for FPT

- As such they need to be highly **specific** – few false positives
- Less concerned with the individual animal than with trends in a herd over time
- Screening test will be negative in those that don’t have FPT



How well did the Triple J test perform?

- This test is unvalidated but is perceived as gold standard
- There was no difference in the measurements at 24 hours and 40 hours- expedite results?
- Accuracy of external lab test and internal lab test was 84.3%
- Accuracy (6+85)/108

	FPT internal lab	
FPT external lab	**Yes**	**No**
Yes	6	5
No	12	85

Test		Cutpoint	Sensitivity	Specificity	PPV	NPV	Accuracy
Brix	Ref	8.4	76.9	66.0	27.2	94.5	67.6
	ROC	8.2	65.4	75.6	30.6	92.9	73.3
ZST	Ref	20	86.5	60.6	26.6	96.5	64.3
	ROC	15	76.9	80.3	39.2	95.5	79.8
TP	Ref	5.2	71.2	78.0	34.9	94.3	71.3
	ROC	5	51.9	86.3	38.6	91.6	80.1

Test results for 3 indirect tests to predict FPT in dairy calves (defined as serum IgG concentrations of >10g/L). Cut-points were derived from published data (Ref) and were optimised based on receiver operating characteristic curve analysis (ROC).

Take home messages

- RID testing is a reference test not a gold standard
- It is still useful to monitor calf FPT using indirect tests
- Cutpoints for all indirect measures need to be lowered to improve accuracy and specificity
- ZST: is there a place for this?
- Results are contextual: over-interpretation is a risk!

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