



Rumen contents from slaughtered cattle and sheep to study *in vitro* degradation of selected feeds



By

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The Problem?



- Rumen degradation data sets are needed to formulate nutritionally balanced diets for ruminant animals.
- Live animals are used to obtain rumen degradation profiles of various feed ingredients.
- Either intact or surgically prepared animals are required
- This process is invasive and so it is
 - *highly regulated,*
 - *laborious,*
 - *expensive and*
 - *undesirable.*





The Solution?



- Rumen fluid (RF) from freshly slaughtered animals can be used as a safe alternative.
- However, the same ruminant species may not always be available at an abattoir.
- ❖ This study compared RF from cattle (RFC) and sheep (RFS) as non-invasive alternatives to estimate *in vitro* degradation of 12 commonly used feed ingredients.





Materials and Methods 1



- 12 Feeds were collected representing
 - Six Concentrates as by-products of:
 - 2 cereals
 - 2 legumes
 - 2 oil seed meals
 - Six grasses
 - 2 grass types (ryegrass & mixed with clover)
 - 2 seasons
 - 2 fields
- All samples were dried & ground via a 1 mm sieve



Materials and Methods 2



- Each RFC and RFS was filtered, buffered & gased
- Factorial methods were used for in vitro experiments
- About 0.4g of each feed sample was incubated with 40 ml of either RFC or RFS for 0-72h at 39°C.
- The undegraded residues were washed & dried to estimate degradation of each feed at each time.
- A curve fitting model was used to derive constants and effective degradability (ED) of DM and CP.
- The data were statistically analysed by Minitab.

Results 1 (Degradation Profiles, *Concentrates*)

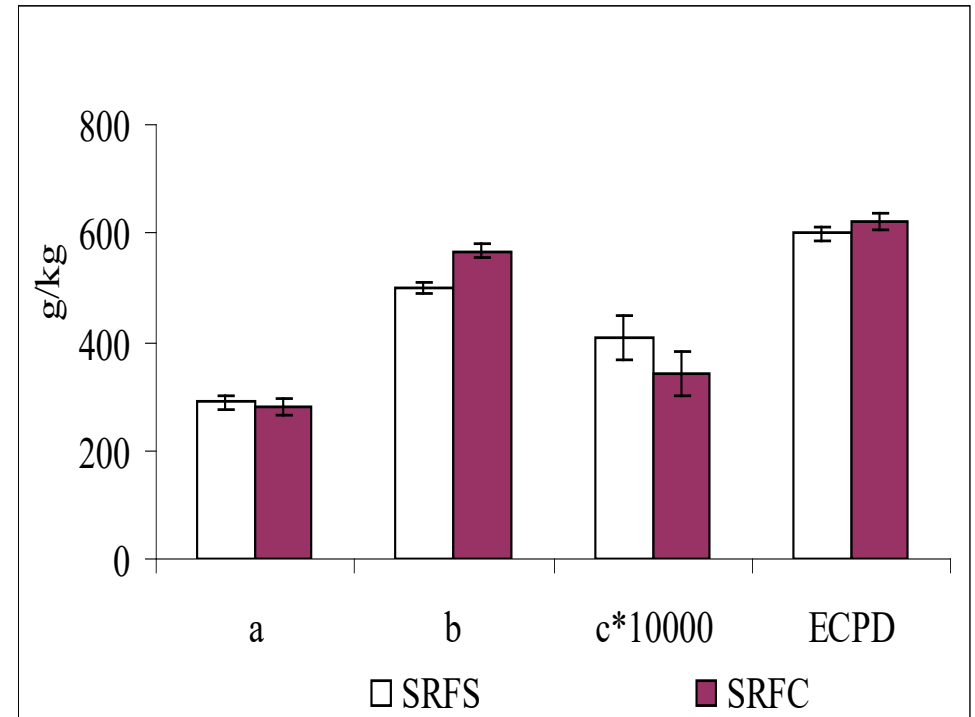
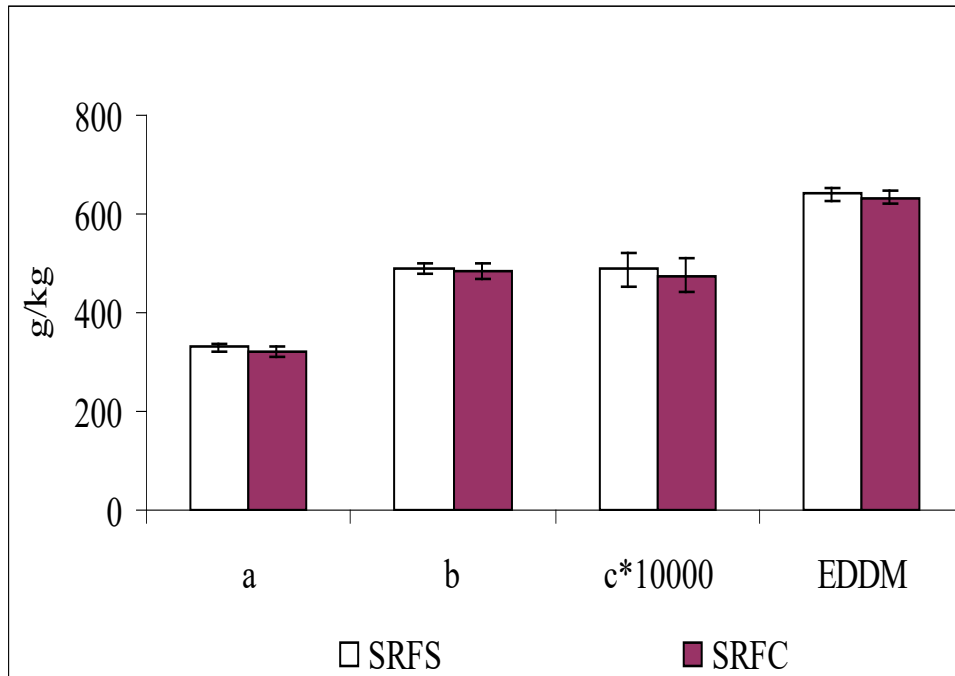
Concentrate	SRFS (Sheep)				SRFC (Cattle)			
	Degradation constants			DMD	Degradation constants			DMD
	<i>a</i>	<i>b</i>	<i>c/hour</i>	<i>EDMD</i>	<i>a</i>	<i>b</i>	<i>c/hour</i>	<i>EDMD</i>
Wheat Feed	278 ^{bcd}	429 ^d	0.123 ^a	628 ^{de}	262 ^c	449 ^b	0.094	624 ^{de}
Maize G Feed	290 ^{abc}	595 ^{ab}	0.037 ^b	675 ^{cd}	319 ^b	508 ^b	0.057	667 ^{cd}
Micro Peas	322 ^{ab}	597 ^{ab}	0.09 ^{ab}	805 ^a	328 ^{ab}	607 ^a	0.071	799 ^a
Micro Beans	348 ^a	547 ^{bc}	0.062 ^b	758 ^{ab}	353 ^a	516 ^b	0.080	752 ^{ab}
Rape S Meal	230 ^{cd}	528 ^c	0.050 ^b	595 ^e	226 ^d	500 ^b	0.047	573 ^e
Soy B Meal	227 ^d	612 ^a	0.076 ^{ab}	705 ^{bc}	256 ^c	638 ^a	0.047	701 ^{bc}
SE	20.7	18.60	0.019	22.66	9.85	26.17	0.017	17.71

Results 2 (Degradation Profiles, *Grasses*)

Grass	SRFS (Sheep)				SRFC (Cattle)			
	Degradation constants			DMD	Degradation constants			DMD
	<i>a</i>	<i>b</i>	<i>c/hour</i>	<i>EDMD</i>	<i>a</i>	<i>b</i>	<i>c/hour</i>	<i>EDMD</i>
F1S1	230 ^b	497	0.029	509^b	223 ^c	592 ^{ab}	0.019	501^b
F1S2	248 ^b	516	0.027 ^b	532^{ab}	260 ^b	517 ^{abc}	0.023	530^{ab}
F2S1	255 ^b	569	0.024 ^b	544^{ab}	249 ^{bc}	633 ^a	0.018	536^{ab}
F2S2	308 ^a	512	0.028 ^b	577^{ab}	309 ^a	426 ^c	0.033	567^{ab}
F3S1	276 ^{ab}	564	0.024 ^b	570^{ab}	270 ^b	475 ^{bc}	0.036	560^{ab}
F3S2	320 ^a	559	0.029 ^b	626^a	315 ^a	485 ^{bc}	0.037	612^a
SE	15.79	30.49	0.008	36.43	10.06	40.92	0.007	29.35

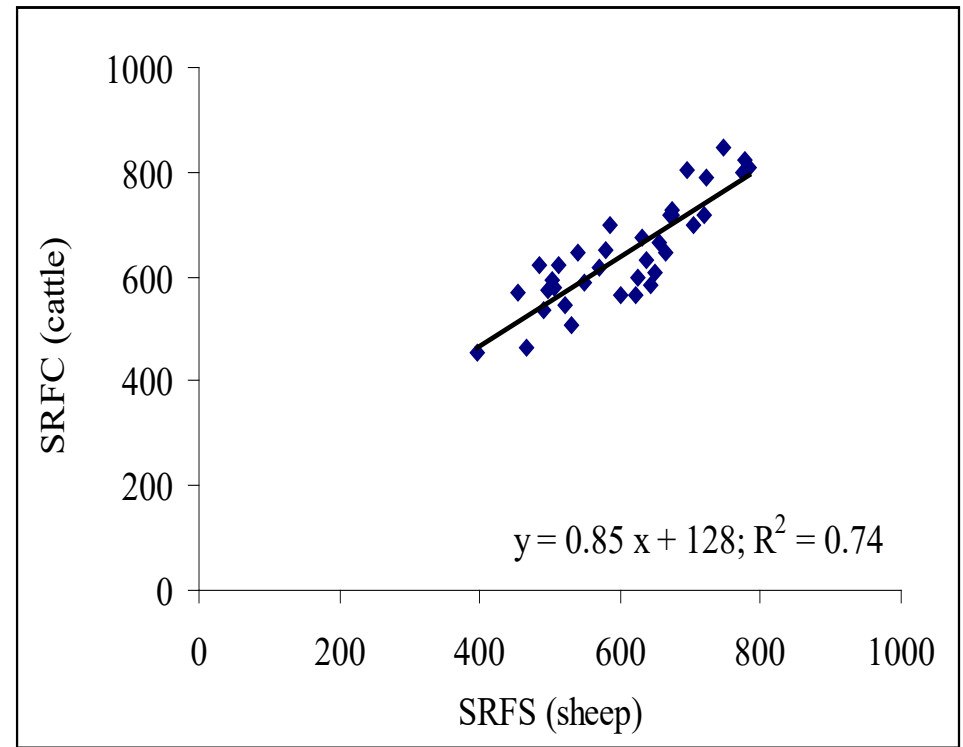
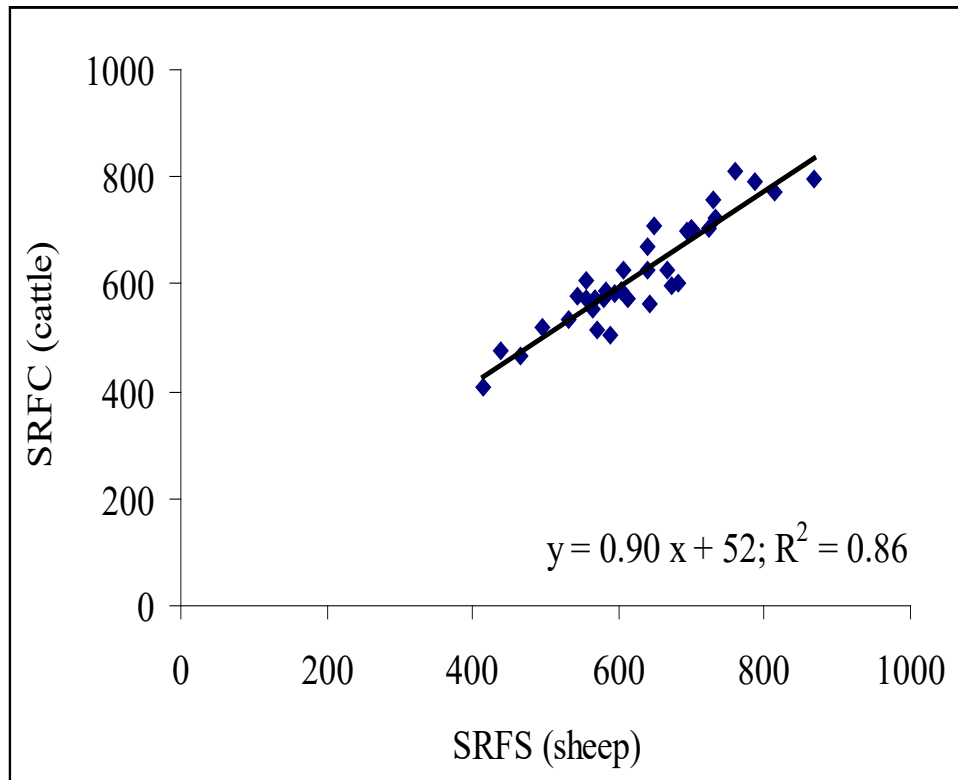
Results 3

Species compared well for
Degradation constants, EDMD and ECPD ($K=0.02h^{-1}$)



Results 4

**Correlations between Sheep vs Cattle were excellent for
EDMD and ECPD ($K=0.02h^{-1}$)**



Summary

- Degradability differed ($P < 0.05$) with the feed & RF types.
- The feed ranking by degradability estimates was remarkably similar for RFS and RFC.
- Strong correlations were found between RFS and RFC ($R^2 = 0.86$ for EDDM and **0.74 for ECPD**).
- The ECPD values using RFS or RFC matched well with the reported literature values of similar feeds.
- The degradability values for RF of slaughtered animals compared well with those for the fistulated animals.



Conclusions



- RF obtained from freshly slaughtered sheep or cattle could equally be used to estimate degradability of feeds.
- Slaughtered animals can replace fistulated animals as donors of RF for *in vitro* studies to estimate degradation of ruminant feeds.
- However, access to a reputable abattoir may be restricted in challenging times, e.g. covid 19, H&S.
- Thus, good coordination with an abattoir is required to ensure the availability of RF from similar animals.



- **Thanks for your attention**

- *Any Questions?*

