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Facilitating vertical integration of knowledge from animal physiology to farm system level.

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Acknowledgements to P.N.P. Matthews

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Outline

- Agronomy teaching module introduced to BVScII at Massey University in 2004;
- 21 lectures & five 3 hour field practicals;
- 4 “farmlets” (16 sheep on 0.8 ha): one notional best practice, three “deliberate mistakes”;
- Will report teaching module design and experience in implementation.

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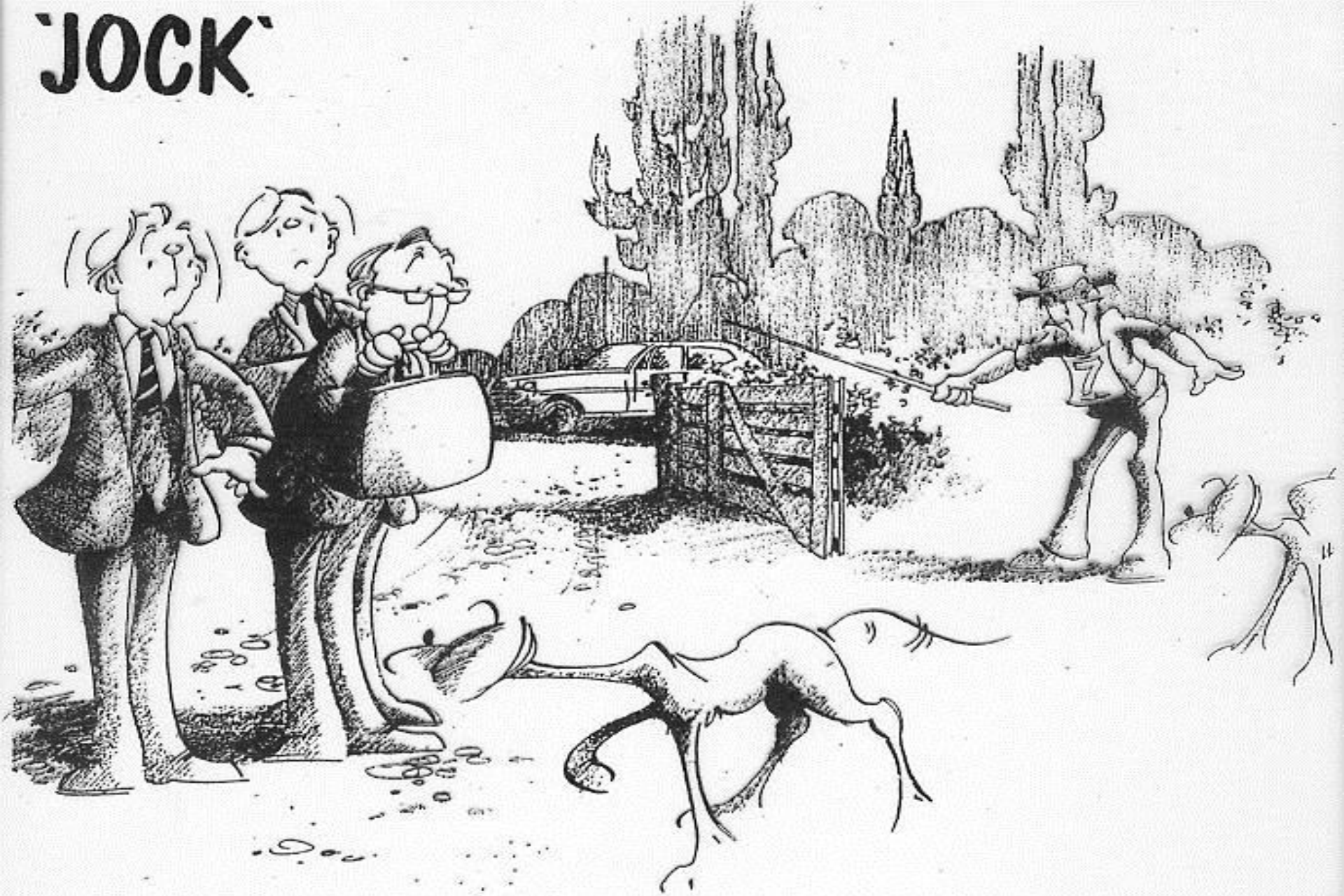
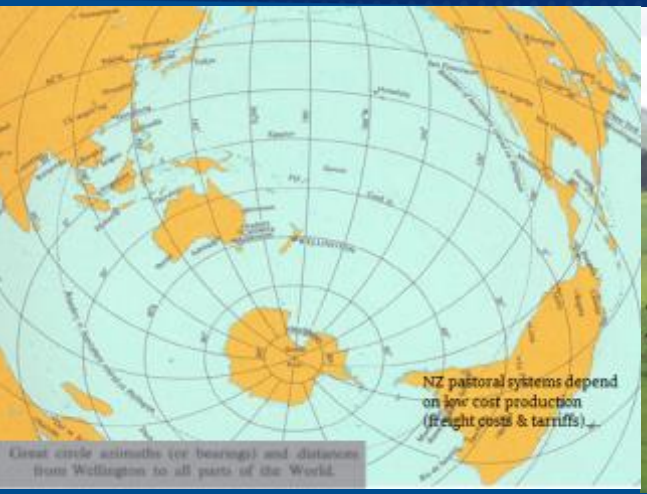
Considerations

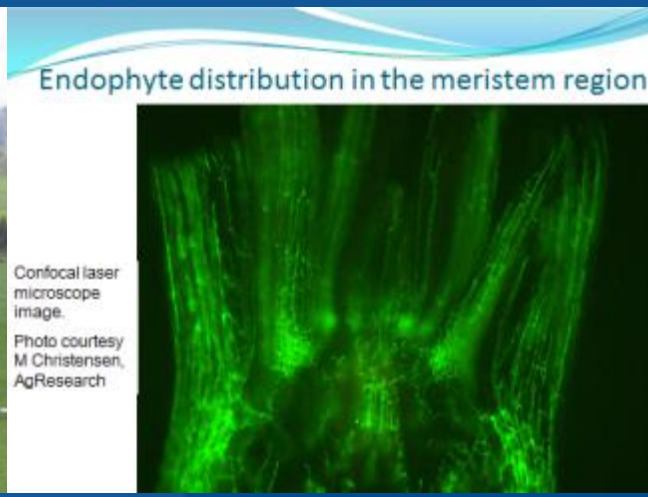
- Have to believe the students deserve ‘a good innings’;
- Class size ~100, only 25% see themselves in rural practice;
- Wide range of entry backgrounds (Asian, North American, ‘Kiwi’, city raised, farmer’s children);
- ➲Target end point: relevant to future practice; understand farm systems – what do farmer clients ask of their vet?
- Pitched to be “do-able” for all, informative for city raised, yet engaging for those with farming background;
- ➲ Make learning a personal discovery: Asked (and granted) internal assessment; assignments a key component.



". . . . . Steadee, steadee . . . . . now walk up!"

Lecture topics





1. Agriculture in a world context;
2. Seasonal pasture production curve;
3. Matching feed supply with animal demand;
4. Stocking rate, Lambing / Calving date;
5. Introduction to feed budgeting;
6. Points of difference in ryegrass varieties;
7. Fungal endophytes in ryegrass & tall fescue;

Etc ….

The farmlets

- 16 Sheep on 0.8 ha, May to September inclusive (mid pregnancy – early lactation);
- Feed grown 4.8 tonnes, feed requirement 5.2 tonnes, growth timing not matched to demand;
- Grazing management (via rotation length) affects timing of feed delivery & quantity of grass grown;
- Class measure grass cover, move/weigh sheep, make a predictive feed budget at start & compare retrospectively with actual.

Farmlet design

- A: Notional best practice for our site: 48 day rotation & set stocking at start of lambing (saved feed to animals for feed late pregnancy / early lactation);
- B: 16 Day rotation: no feed storage and pasture growth reduced by low herbage mass = disaster;
- C: 72 day rotation: supra-optimal feed storage, animal bodyweight reduction;
- D: 48 day rotation & set stocking 3 weeks before lambing (saved feed to animals too early in late lactation).


Photo taken – Monday 12 July?

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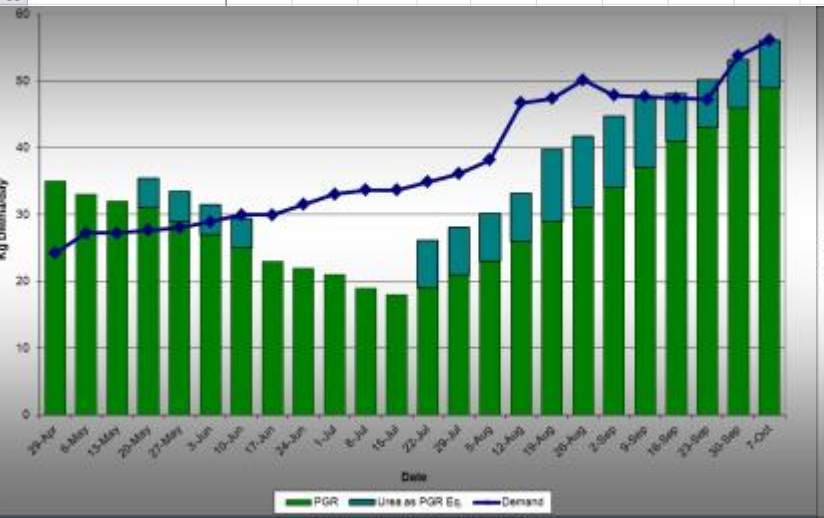
Assignment 1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	**FARMLET Y**	**29-Apr**	**6-May**	**13-May**	**20-May**	**27-May**	**3-Jun**	**10-Jun**	**17-Jun**	**24-Jun**	**1-Jul**	**8-Jul**	**15-Jul**	**22-Jul**	**29-Jul**
2															
3	Number of Sheep	16	18	18	18	18	18	18	18	18	18	18	18	18	18
4	Hectares for grazing	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
5	sheep/ha	20.0	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
6	Ewe body weight	66.2	66.2	66.2	66.2	66.2	66.2	66.2	66.2	66.2	66.2	66.2	66.2	66.2	66.2
7	Gain/loss per day	0	0	0	0	0	0	0	0	0	0	0	0		
8	Pregnant Ewes	16	18	18	18	18	18	18	18	18	18	18	18	18	18
9	Lactating Ewes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10															
11	**Whole flock requirements**														
12	Body maint MJME	222.8	250.6	250.6	250.6	250.6	250.6	250.6	250.6	250.6	250.6	250.6	250.6	250.6	250.6
13	Gain/Loss MJME	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	Lactation MJME	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	Pregnancy	0.0	0.0	0.0	3.7	7.4	15.7	25.2	25.2	39.3	53.4	59.4	59.4	70.5	81.6
16	MJME/day	222.8	250.6	250.6	254.4	258.1	266.3	275.8	275.8	289.9	304.0	310.0	310.0	321.2	332.3
17	**Intake kgDM/ewe/day**	1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.5	1.5	1.5	1.6	1.6
18	Actual Intake	1.1	1.3												
19	kg pasture DM/day	19.4	21.8	21.8	22.1	22.4	23.2	24.0	24.0	25.2	26.4	27.0	27.0	27.9	28.9
20	**kg DM/ha/day Reqmnt**	**24.22**	**27.24**	**27.24**	**27.65**	**28.05**	**28.95**	**29.98**	**29.98**	**31.51**	**33.05**	**33.70**	**33.70**	**34.91**	**36.12**
21	**kg DM/ha/day Supply**	**35.0**	**33.0**	**32.0**	**35.5**	**33.5**	**31.5**	**29.5**	**23.0**	**22.0**	**21.0**	**19.0**	**18.0**	**26.1**	**28.1**
22	Urea as PGR Eq.	0.0	0.0	0.0	4.5	4.5	4.5	4.5	0.0	0.0	0.0	0.0	0.0	7.1	7.1
23	**Pasture growth (kg DM/ha/dy)**	35	33	32	31	29	27	25	23	22	21	19	18	19	21
24	Acutual Pasture Growth	34.4	34.4												
25	ME Value of pasture	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
26	Urea applied (kg)	0	27.1739	0	0	0	0	0	0	0	0	43.4783	0	0	0
27	Nitrogen applied (kg)	0	12.5	0	0		0	0	0	0	0	20	0	0	0
28	**Pasture Cover (kg DM/ha)**	1860	1900	1934	1988	2026	2044	2040	1991	1925	1840	1737	1628	1566	1510
29	Actual Pasture Cover	1860	1994												
30	**Pasture Cover goals**														
31	**Feed surplus/deficit per week**	60.4	32.2	26.6	43.8	30.3	14.1	-2.9	-39.1	-53.3	-67.5	-82.3	-87.9	-49.1	-44.7
32															
33															

- Supply and demand calculations in MS XL mirror industry farm systems models: Farmax, Overseer, Udder, etc;
- Mismatch in time of supply and demand and impact of N;
- Storage (May) & release (June July) of cover (and animal body weight change).



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Pedagogical

- Lecture on calculation of animal energy demand – body maintenance MJ/dy = 0.6 * $BW^{0.75}$ etc;
- Voluntary Q & A tutorial in time window when class working on assignment;
- Allow group work (max. 3 per group);
- Invite email Qs - send me XL worksheet and specify cell seeking comment (ensure rapid reply);
- Offer office appointments if needed.

E-mail sample

Sent: Monday, 30 April 2012 11:04 p.m.Subject: BVSc2 Agronomy assignment

Hi Cory, Hope this finds you well.

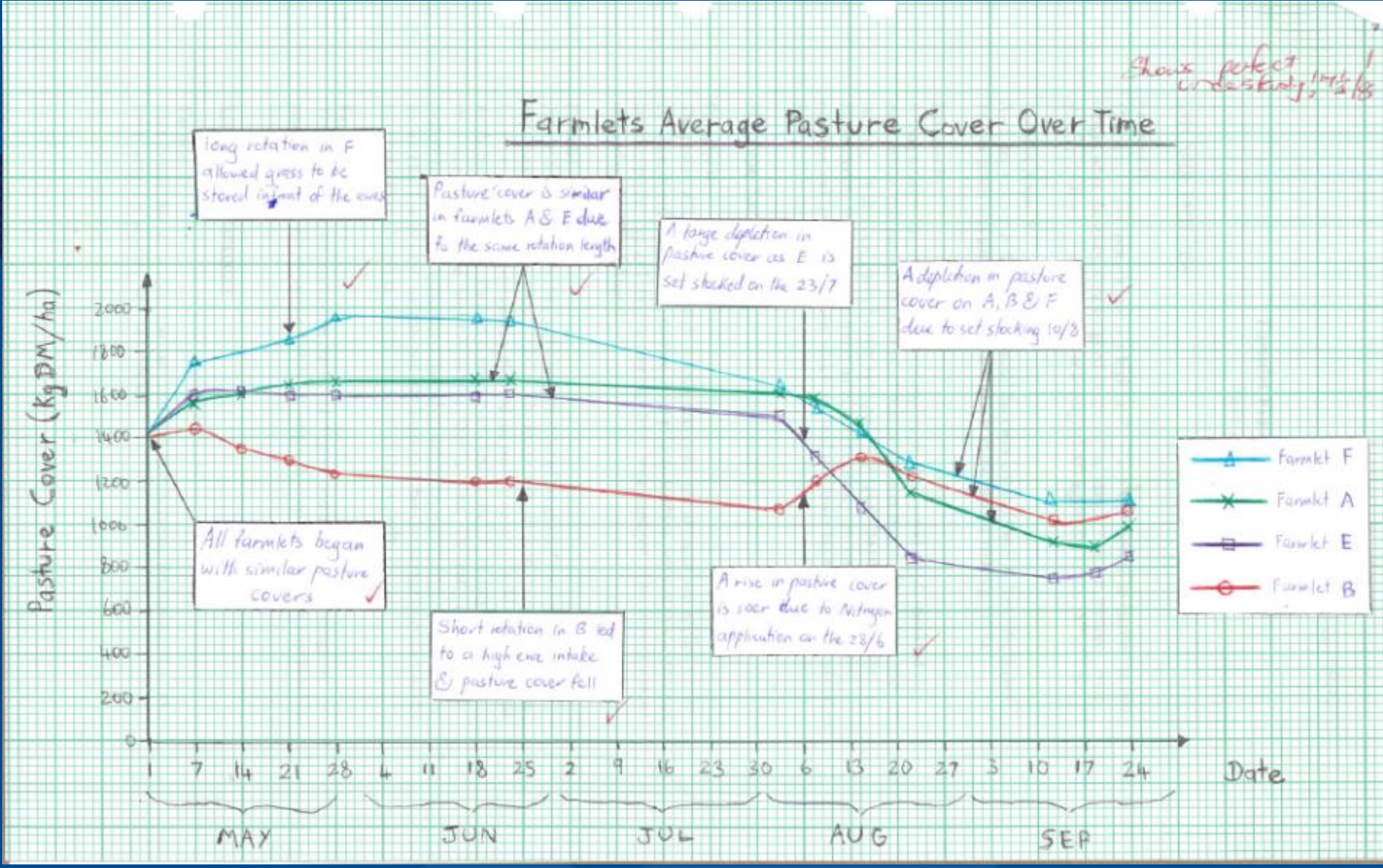
I was wondering whether you would mind having a quick look at my feed budget spreadsheet? It seems something quite drastic has gone array but after many long hours trying to figure it out am unsure of where I have gone wrong. My poor sheep will not fair very well at this rate following parturition. Many thanks for your help. Kay

Sent: Tuesday, 1 May 2012 1:40 am

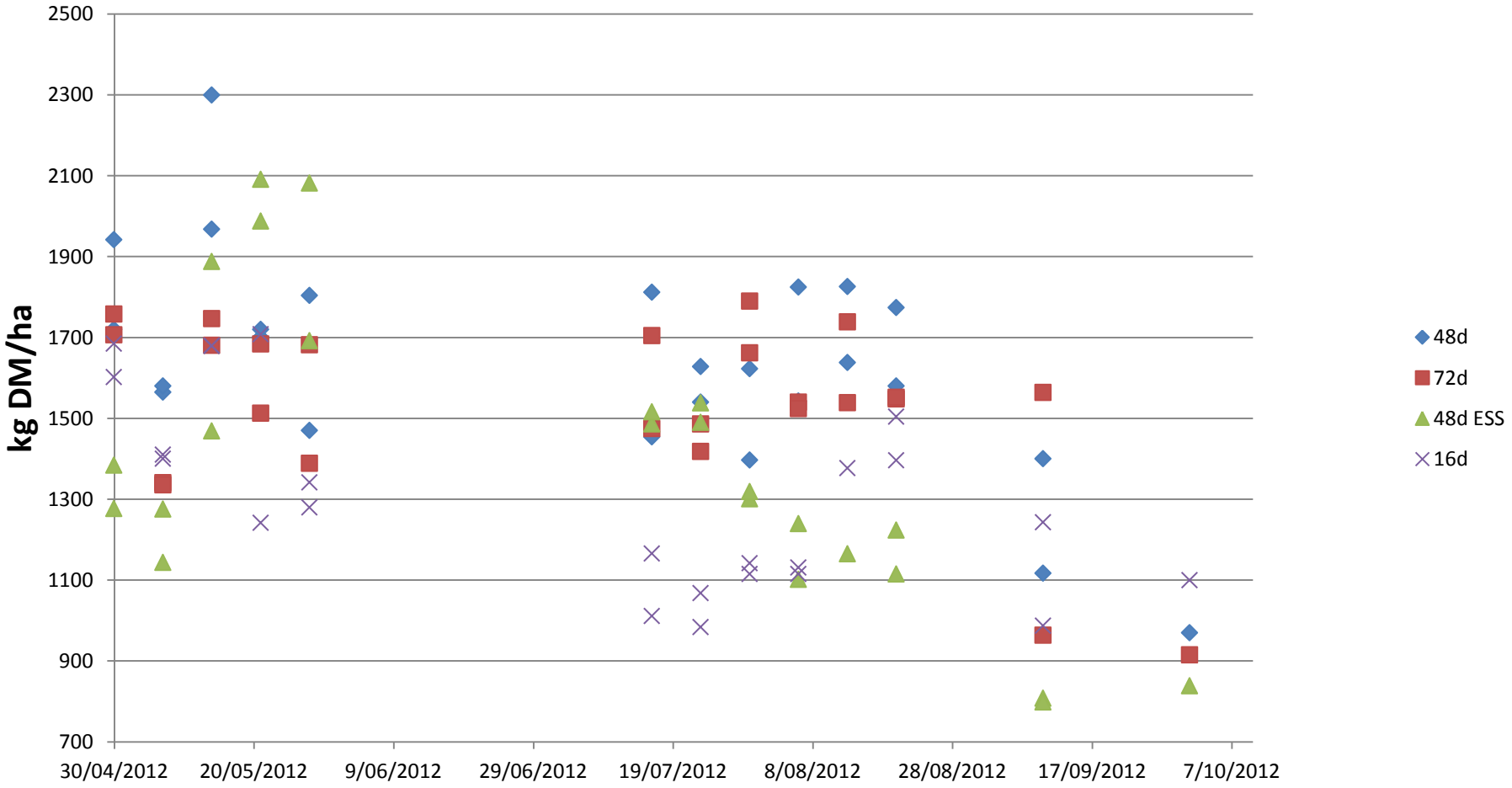
Hi there: I think you are doing better than you realise; The demand (5.7 t DM/ha) is on the high side of the valid range but not erroneous. The model answer has 4.5 t grass at this site - with only 4.1 t you simply can not carry 20 sheep per ha - you are over stocked. You could also consider adding 30 kg / ha N in July to deliver 300 kg DM/ha response in Aug / Sept. Cory M

Slightly low value for grass ME inflated demand by 0.5 t DM/ha and she underestimated grass growth by 10%; her model told her she would run out of grass! Recommended fewer sheep & use N fert.

About 30 similar emails per day in the week before the assignment due ….variety of topics / tones , singles/ conversations, about 1/3 class



Assignment 3: (i) How do you think cover changed on the 4 farmlets over time?



Raw rising plate meter cover data as measured by 2012 class (different student groups each week).
I tell them we can't dismiss the RPM – farmers use it!

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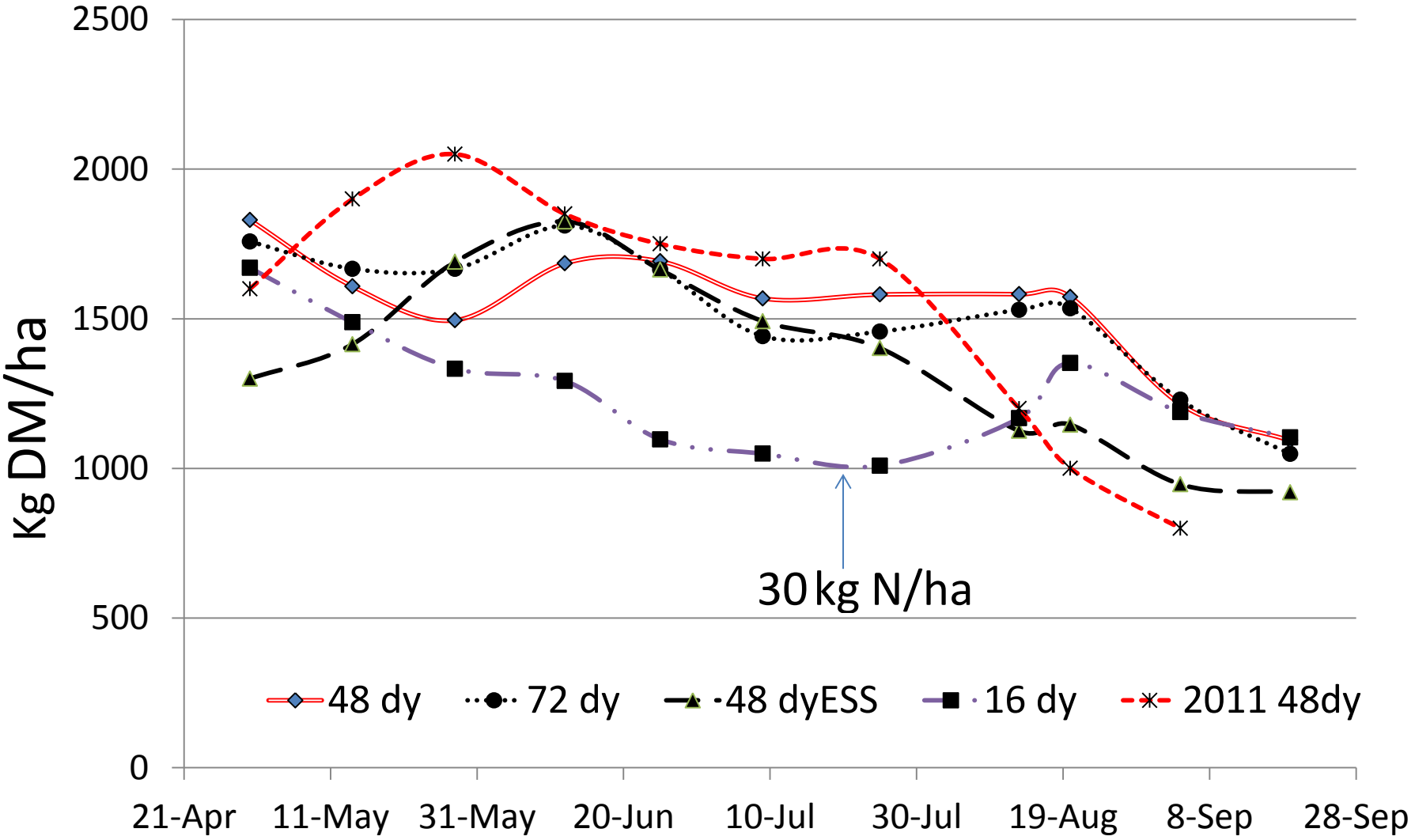

Data as collected by a staff member;
(Single, experienced operator).

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Logic overview

Farmlet	Mid-pregnancy	Late pregnancy	Lactation
A 48d Set S at Lambing	Adequate intake	Modest restriction	Benefit of feed carried forward
B 16d Rotn	High intake	Low intake	Intervention needed
C 72d Rotn	Low intake	Increasing intake	Likely highest intake
D 48d Early Set Stock	Adequate	Party time	Low intake

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2004-09 Results

Farmlet	Final cover	No. Lambs	Wt. Lambs	Lamb wt kg/ha
A 48d Set S at Lambing	980	23	12.9	365
B 16d Rotn	930	20	13.0	323
C 72d Rotn	1190	23	12.3	352
D 48d Early Set Stock	930	21	13.0	345

$50k when scaled up to 500 ha

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Hi Cory,
Here's my last assignment. I had a good time in your lectures this year. Thanks for giving me a different perspective on something I never thought I would enjoy :). Take care!

Issue of concept internalisation versus rote learning!
More clinical experience? (NEFA etc)

- Too long to mark assignments
- Too much housekeeping at start of lecture

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Abstract

We describe a teaching methodology evolved over 25 years for taking incoming students with little farming background to near-consultancy level in terms of ability to discuss feed supply and demand manipulation with practicing farmers. The methodology is currently used in a double semester course offering to 2nd year BVSc students at Massey University with positive feedback from students. Component skills such as visual assessment of herbage mass are introduced at the outset. A keystone of the methodology is the provision of student operated 'farmlets' with 16 sheep on 0.8 ha, where the storage of autumn-surplus feed as increased herbage mass, and release back to animals for winter and early lactation feed is demonstrated. Feed budget calculations for these farmlets in units of MJ metabolisable energy and kg pasture DM/ha/day promote understanding of animal physiology principles and simulate those of a larger scale commercial farm. As currently offered the module comprises 20 lectures and 5 organised 2 hour farmlet discussion and data collection visits. Students complete additional farmlet work in their own time, such as moving or weighing sheep. Two written assignments promote integration of component knowledge and ownership of that information by participants.

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Facilitating vertical integration of knowledge from animal physiology to farm system level

Matthew C

2012