Rumen8 Tropics Course Exercise Details for Trainees

Exercise 1-1:

Work through a scenario on the white board or butchers paper, demonstrating how to calculate energy, protein and fibre requirement using the 'Short Guide' and Worksheet 1 – Cow requirements. It adds interest if a trainee volunteers information about a farm they are familiar with and this is used as the example. At this stage **do not** use an example where cows are losing body condition as this complicates the calculations.

Then get trainees to calculate energy requirement for a scenario where condition is being maintained vs another where condition is being gained. This can be done in pairs. Go around the room to check that everyone is able to do the calculations and discuss the results as each exercise is completed.

Finally, once trainees are comfortable using Worksheet 1 and the Short Guide, work through a scenario where condition score is being lost. This concept (i.e. energy being obtained from condition score loss rather than from feed) can be a difficult one for people to grasp.

Remember that Worksheet 1 gives an assessment of the status quo – if the cow is losing condition it generally means she isn't eating enough - it is unlikely that condition loss will be a feeding target. So to maintain or gain condition more energy must be fed. But cows in early lactation often cannot eat enough to avoid a loss in condition score.

Get the trainees the work on these scenarios:

1. Assume average energy content of diet is 10 MJ ME/kg DM).
   Cow liveweight 500kg.
   Walking 3 km/day on flat terrain.
   30-days pregnant – mid lactation.
   Producing 15l/day; Fat 4.0% Protein 3.0%.
   Current condition score 3.5 and maintaining.

2. As above but with a **gain** in 0.5 body condition score in next 60 days.

3. As above but with a **loss** in 0.5 body condition score in next 60 days.

Practical exercise 2-1:

- Part 1: Total intakes of DM, CP, NDF

You will need the "Short Guide' and multiple copies of Worksheet 1 and Worksheet 2

Work out total daily intakes of DM, CP, NDF and ME from this diet.

	Feed intake kg/d as fed	DM g/kg	ME MJ/kg DM	CP g/kg DM	NDF g/kg DM
Napier grass	40	200	9.0	153	611
Dairy meal	7	900	11.7	160	277

- Part 2: Cow requirements

Work out nutrient requirements for this cow:
- Average energy content of the diet is 10 MJ ME/kg DM.
- Cow liveweight 500kg. Condition score 3.0 and steady.
- Grazing situation total distance walked 3 km per day (flat terrain).
- Mid lactation (150 days), 60 days pregnant.
- Producing 15l/day; Fat 4% Protein 3%.

- Part 3: Make your own diet

The third part of this exercise is more challenging and there are a range of possible answers. The aim is "doing a ration calculation". Do your calculations in pencil as several iterations are likely to be required before a diet balance is achieved.

Task details:

Use cow specifications / nutrient requirements given above (Task 2).

Use some of the feeds listed below. Formulate a diet of your choosing with Worksheet 2.

Present your findings.

Feed	DM g/kg	ME MJ/kg DM	CP g/kg DM	NDF g/kg DM
Lucerne fresh	250	9.0	200	400
Rhodes grass fresh	250	8.5	100	700
Rhodes silage	300	8.0	80	700
Dairy meal std	900	12.0	150	300
Molasses	750	12.0	50	10

Practical exercise 2-2:

Exercise on feed cost. Trainees will need a full-sized copy of Worksheet 3 (see below).

Trainees calculate feed costs per kg DM, per MJ ME, per kg CP and per kg NDF for the two hays listed below.

Feed	Cost KES/t as fed	DM g/kg	ME MJ/kg DM	CP g/kg DM	NDF g/kg DM
Lucerne hay	23,000	891	8.7	189	463
Desmodium hay	15,000	852	7.4	128	512

Worksheet 3: calculating feed cost per kg DM, per MJ ME, per kg CP and per kg NDF - Rumen8 Tropics Course

Enter your data in the blue cells and calculate as shown

FEED 1

Value per tonne DM

KES/tonne as fed   DM g/kg   KES/tonne DM

[   ]   divided by   [   ] /1000 = [   ]

Value per MJ ME   divide by 1000

KES/kg DM   MJ ME/kg DM   KES/MJ ME

[   ]   divided by   [   ]   = [   ]

Value per kg CP

KES/kg DM   CP g/kg DM   KES/kg CP

[   ]   divided by   [   ] /1000 = [   ]

Value per kg NDF

KES/kg DM   NDF g/kg DM   KES/kg NDF

[   ]   divided by   [   ] /1000 = [   ]

FEED 2

Value per tonne DM

KES/tonne as fed   DM g/kg   KES/tonne DM

[   ]   divided by   [   ] /1000 = [   ]

Value per MJ ME   divide by 1000

KES/kg DM   MJ ME/kg DM   KES/MJ ME

[   ]   divided by   [   ]   = [   ]

Value per kg CP

KES/kg DM   CP g/kg DM   KES/kg CP

[   ]   divided by   [   ] /1000 = [   ]

Value per kg NDF

KES/kg DM   NDF g/kg DM   KES/kg NDF

[   ]   divided by   [   ] /1000 = [   ]

Step by step approach to Exercise 3-1

- Open Rumen8 in Compact Mode

- Set up cow:

    - 500 kg LW, -0.50 kg LWC

    - 60 days in milk; Not pregnant (0 days)

    - Milk yield 17 litres, fat 4%, protein 3%

    - Check that DMI method to 'NDF intake' (1.3% of LW)

    - Cow is stall-fed; distance walked 0 km (flat terrain)

- Load these two feeds from the library

    - Dairy Meal Standard. Feed cow 6.3 kg per day

    - Brachiaria spp EarlyVegetative

- Switch to the Cost/Price tab. Edit feed cost & milk price values as follows:

    - Dairy Meal Standard: KES 43,000/t as-fed

    - Brachiaria spp EarlyVegetative: KES   2,500/t as-fed

    - Milk: KES 35/litre

- Get trainees to address the following questions

    - How much Brachiaria is required to meet demand for ME?

    - What can you say about this diet? DMI? MP? Minerals?

    - What is the cost of this diet per kg and per MJ?

    - What is daily milk income?

    - What is the Margin?

    - Can you speculate about the quality of the two feeds?

- Save file with the file name "Rumen8Tutorial3-1.rm8"

Step by step approach to Exercise 3-2

- Open Rumen8 in Standard Mode.

- Open file "Rumen8Tutorial3-1.rm8".

- Save file with new name "Rumen8Tutorial3-2.rm8".

- Go to the File Menu and open Preferences.

- Look at various options in General tab.

  - Milk units (incl. milk components), feed units, tooltip details, dry matter intake estimation, currency options, etc.

  - Important: do not change settings. We must all use the same default preferences!

- Skip Advanced and Recommended levels tabs.

- Look at Standard Cows to see options available.

- Tooltips:

  - Hover your mouse over different parts of Rumen8 to see range of tooltips that become visible at different places.

- Go to the View menu and look at the 4 options available.

  - Call up the Ingredient details for the Brachiaria used in this exercise.

  - What are the ME, CP and NDF values for this particular grass?
    How do you rate these values relative to what cows require?

- Go to Help Menu & explore different options available.

  - Note that "FAQ" is only available if you have internet access as this command takes you to FAQ page on Rumen8 website.

  - Look at Help About & the three options: Acknowledgements, References and EULA.

Step by step approach to Exercise 4-1

- Open Rumen8 in Standard Mode.

- Set up an average cow for a herd

  - Go to the 'Animal' menu & select 'Use Standard Animal'

  - Select Lactation 4000 litres & Early Lactation

  - LW 500 kg – breed Holstein

  - Click on the calculator icon next to live weight change

  - Set days in milk to 90 and click OK

  - What is the LW change predicted by Rumen8?

  - Cow not pregnant (0 days)

  - Set milk yield to 15 litres (4% fat, 3 %protein)

  - Set DMI estimation method to "NDF intake" (1.3% of LW; see Preferences)

  - Set farm terrain flat - distance walked 0 km

- Go to Price tab and check milk price

  - KES 35 per litre

- Load three feeds from the library & enter costs in Feed Cost tab

  - Maize silage DM<>30-35%   Cost: KES   6,000/t (KES 1.7/MJ ME)

  - Napier fresh 60 cm   Cost: KES   2,000/t (KES 1.1/MJ ME)

  - Sunflower seed meal dehulled   Cost: KES 40,000/t (KES 4.0/MJ ME)

- Save file as 'Rumen8Tutorial4-1.rm8'

- Start feeding your cows with various amounts of the 3 feeds listed above

- Use the Diet tab to balance your diet for:

  - Dry matter intake, Metabolisable energy, Metabolisable protein, NDF & starch.

- Group discussion on merits of various diets that trainees have formulated.

- What is the Margin that you have been able to achieve?

- Is there a best solution? What remains missing from this diet?

- Save the file!

Step by step approach to Exercise 4-2

•   Open Feed Editor.

•   Create 3 new feeds that are used at a farm – Feed test results are as shown below.

Feed name	MJ ME/kg DM	CP g/kg DM	NDF g/kg DM	Starch g/kg DM	Cost KES/t as-fed
X4 Good quality grass (fresh)	9.0	120	650	20	2,750
X4 Maize silage	10.5	70	440	275	6,000
X4 Protein meal	12.0	400	270	30	75,000

•   Trainees must find a feed similar to each of the three feeds listed above. Highlight those feeds and click on "Add Copy". Give the Feed the new names as shown above. Then edit the feed parameters as indicated and save each feed. Trainees have now created 3 new feeds, with names starting with 'X4'.

•   Load the three new feeds from the feed library. Also add these additional feeds to the ingredient list

    Napier fresh 120 cm   KES 2,000/t as-fed

    Maize grain   KES 70,000/t as-fed

    Limestone (CaCO3)   KES 15,000/t as-fed

•   Load a Standard Animal 5000 litres mid lactation – stall-fed

•   Formulate a diet that meets all nutrient requirements within intake limits. Use the Diet tab to balance diets for dry matter intake, metabolisable energy, metabolisable protein, NDF and starch.

•   Examine the Diet detail screen. Find the following values

    •   ME and CP content of the total diet (MJ/kg DM and % CP in DM)

    •   DMI as % of LW

    •   NDF intake (kg/cow/day)

    •   Starch & sugar content (% in DM)

•   Save the file as "Rumen8Tutorial4-2.rm8"

•   What is the diet solution and margin that each trainee has achieved? Start a group discussion on merits of various diets that have been formulated. Is there a best solution?

•   What remains missing from this diet?

Step by step approach to Exercise 4-3

- Open Rumen8 and select Dairy heifer unmated .

- Heifer rearing targets:

  - Mature cow weight 500 kg.

  - Target weight for mating at 15 months = (500*55%) =275 kg.

  - Target weight for calving at 24 months = (500*85%) =425 kg.

- Our heifers are 10 months of age and weigh 200 kg. Open the calculator next to LW gain.

  - Enter mature weight, heifer birth date, heifer weigh date , weight and heifer mating start date as below.

  - Rumen8 will calculate the required rate of LW gain to achieve the target mating weight
  at 15 months.

- Load 5 feeds from the library and check feed prices are set as follows:

  - Maize silage DM <>30-35%   KES   6,000 as fed

  - Cottonseed meal decorticated   KES 63,000 as fed

  - Wheat bran   KES 29,000 as fed

  - Brachiaria spp LateVegetative   KES   2,000 as fed

  - Brachiaria spp EarlyVegetative   KES   2,500 as fed

- Formulate a diet to meet animal requirements within intake limits.

- Create a Diet Report for this group of animals.

- Save the file as "Rumen8Tutorial4-3.rm8".

- One or more trainees to present diet solutions incl. margin (income minus feed cost). Discuss the various diets that trainees have formulated. What is the best Margin that has been achieved while also meeting all nutrient requirements? What does this margin mean?

Step by step approach to Exercise Exercise 5-1 Applying Rumen8 at the host farm (~3 hrs)

Outcomes for this session:

- Trainees practice the real-life application of 'the Rumen8 process' to a farm.

Step by step approach to Exercise 5-1

- This session can be done in groups of 2 or 3 trainees with a laptop for each group, or alternatively in one large group watching Rumen8 on a projector screen. There are pros and cons to both approaches.

- The aim is for trainees to set up the current host farm in Rumen8 and to explore nutritional (and other) options to improve performance on the host farm.

- All trainees will need to have the same host farm data that has been collected by the presenter before the start of Part 5.

- Trainees will first set up 'current farm'. Animals, feeds (amount & quality), feed & milk prices.

- Does it make sense? If not, re-assess. • Only proceed if the 'real farm' and Rumen8 farm 'match'.

- Capture 'current farm' in 'Compare'.

- Start to assess merits/deficits of current diet. Look at 'Diet' tab – any major issues? What does 'Diet detail' tab tell us?

- Can diet be improved with feeds available on farm, both nutritionally & financially.

- Is there a possible financial benefit from feeds currently not on farm?

- Store promising alternative diets in Compare.

- Together with farmer discuss findings (get one trainee in each small group to act as 'farmer')

- Conclude with recommendation and provide a clear plan for changing "from A to B"