



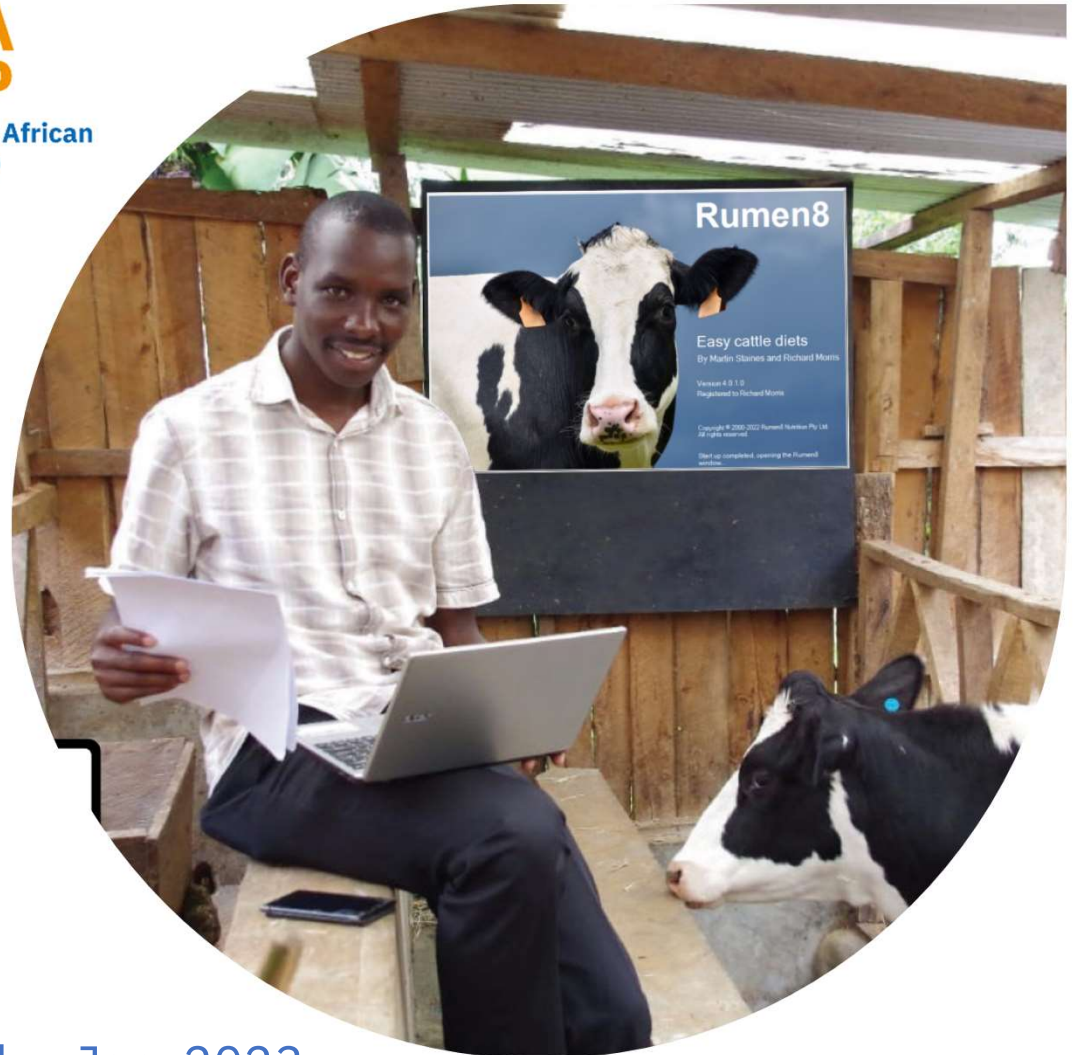
RUMEN8

Easy dairy & beef cattle diets



Dairy cattle nutrition in the tropics using Rumen8

PART 6: Case studies



By M. Staines, J. Creemers and H. Perdok – Jan. 2023

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- Information presented in parts ONE & TWO of this course is based in part on material developed by Dairy Australia
- East Africa photo credits: Jos Creemers, Hink Perdok, Martin Staines, Victor Otieno, Tseard van der Kooi, Nieke Westerik and Imre van der Kolk and SNV

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Part 6

Case studies from East Africa

Course Goal

To improve knowledge and skills of trainees so that they can confidently use the Rumen8 software application to make informed on-farm nutrition decisions to improve farm profit

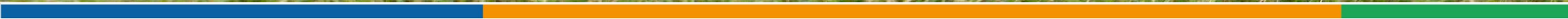


Instructions for case studies

- Eight case-studies are presented here.
- Each case-study consists of 2-3 slides that introduce the scenario(s) and the required tasks
- This is followed by 1 or 2 hidden slides that show possible solutions for each scenario
- First get trainees to attempt to solve the scenarios themselves. Allow up to 20 min for trainees to work with each case study
- Then ask trainees to present and discuss their results
- Finally show trainees the results in the hidden slide(s) (by ‘unhiding’) and discuss the solutions shown compared to those developed by trainees
- A rumen8 file is available for each case study, if access to more details is required



Case study 6-1



Case study 6-1

- A farmer has 3 Friesian cows under a zero-grazing system (0.5 km)
Formulate a ration using Rumens8
- Cows - mean LW 500 kg , LWC 0.07 kg/d; 150 days in milk, 70 days in calf
- Milk production 25 litres/cow/day (milk fat 3.7%; milk protein 3.1%).
 - Milk price 35 KES/litre.
- The following feeds are available

| | |
|---------------------------------|-------------------|
| • Napier grass 60cm | KES 2,000/tonne |
| • Maize silage 30-35% DM | KES 6,000/tonne |
| • Rhodes hay low CP | KES 23,000/tonne |
| • Cotton seed meal decorticated | KES 63,000/tonne |
| • Maize grain | KES 70,000/tonne |
| • Wheat bran | KES 29,000/tonne |
| • Soya bean meal fat <40 g/kg | KES 130,000/tonne |
| • Minerals: Limestone | KES 15,000/tonne |
| Maclick super | KES 240,000/tonne |
| Dairy premix | KES 450,000/tonne |

Case study 6-1

Dairy Diet Diet detail Price Feed cost Compare

Dairy cow Holstein

Live weight (kg)

Live weight change (kg/d)

Days in milk

Days pregnant

Number of animals in herd

Milk yield (l/d)

Milk fat (%m/v)

Milk true protein (%m/v)

Fat:Protein ratio 1.19

Fat, Protein, F+P (kg/d) 0.93 0.78 1.70

DMI estimation method Conventional NDF intake

Farm terrain Distance walked (km/d)

Flat Undulating Steep

| | KES/t DM | KES/t as-fed |
|------------------------------------|--|--|
| Napier fresh 60 cm | <input type="text" value="9615"/> <input type="button" value="↓"/> | <input type="text" value="2000"/> <input type="button" value="↓"/> |
| Maize silage DM <=> 30-35% | <input type="text" value="17910"/> <input type="button" value="↓"/> | <input type="text" value="6000"/> <input type="button" value="↓"/> |
| Rhodes hay Low CP (Chloris gayana) | <input type="text" value="25901"/> <input type="button" value="↓"/> | <input type="text" value="23000"/> <input type="button" value="↓"/> |
| Cottonseed meal decorticated | <input type="text" value="69307"/> <input type="button" value="↓"/> | <input type="text" value="63000"/> <input type="button" value="↓"/> |
| Maize grain | <input type="text" value="79007"/> <input type="button" value="↓"/> | <input type="text" value="70000"/> <input type="button" value="↓"/> |
| Wheat bran | <input type="text" value="32843"/> <input type="button" value="↓"/> | <input type="text" value="29000"/> <input type="button" value="↓"/> |
| Soyabean meal fat < 40 g/kg | <input type="text" value="145089"/> <input type="button" value="↓"/> | <input type="text" value="130000"/> <input type="button" value="↓"/> |
| Limestone (CaCO3) | <input type="text" value="15000"/> <input type="button" value="↓"/> | <input type="text" value="15000"/> <input type="button" value="↓"/> |
| Minerals Maclick Super | <input type="text" value="244898"/> <input type="button" value="↓"/> | <input type="text" value="240000"/> <input type="button" value="↓"/> |
| Minerals Dairy Premix | <input type="text" value="459184"/> <input type="button" value="↓"/> | <input type="text" value="450000"/> <input type="button" value="↓"/> |



Netherlands East African Dairy Partnership

| | | DM | As-fed |
|----------------------------------|------------------------------------|-------------|-------------|
| 1. | Napier fresh 60 cm | 0.00 | 0.00 |
| 2. | Maize silage DM <> 30-35% | 11.00 | 32.84 |
| 3. | Rhodes hay Low CP (Chloris gayana) | 0.00 | 0.00 |
| 4. | Cottonseed meal decorticated | 5.00 | 5.50 |
| 5. | Maize grain | 1.60 | 1.81 |
| 6. | Wheat bran | 0.00 | 0.00 |
| 7. | Soyabean meal fat < 40 g/kg | 0.00 | 0.00 |
| 8. | Limestone (CaCO3) | 0.21 | 0.21 |
| 9. | Minerals Maclick Super | 0.01 | 0.01 |
| 10. | Minerals Dairy Premix | 0.00 | 0.00 |
| 11. | | 0.00 | 0.00 |
| 12. | | 0.00 | 0.00 |
| 13. | | 0.00 | 0.00 |
| 14. | | 0.00 | 0.00 |
| 15. | | 0.00 | 0.00 |
| Total daily intake (kg/d) | | 17.8 | 40.4 |

| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|----------------------------------|------|--------------------------------------|----------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Metabolisable energy | | <input checked="" type="radio"/> | NDF (%DM) | 36.3 | <input checked="" type="radio"/> | Starch (%DM) | 24.2 |
| Supply (MJ) | 198 | NDF (kg) | 6.470 | Sugar (%DM) | 2.9 | <input checked="" type="radio"/> | |
| Demand (MJ) | 198 | peNDF (%DM) | 25.1 | NFC (%DM) | 36.9 | <input checked="" type="radio"/> | |
| Balance (MJ) | 0 | NDF frg (%NDF) | 75.3 | Forage : Conc | 62:38 | <input checked="" type="radio"/> | |
| Density (MJ/kg DM) | 11.1 | NDF frg (%lw) | 0.97 | Ash (%DM) | 5.6 | <input checked="" type="radio"/> | |
| Metabolisable protein | | <input checked="" type="radio"/> | RDP/UDP protein | | Enteric methane | | |
| Supply (g) | 1925 | RDP (%CP) | 62.6 | Total (g/cow) | 336 | | |
| Demand (g) | 1702 | UDP (%CP) | 37.4 | Intensity (g/L) | 13.5 | | |
| Balance (g) | 223 | Excess protein (g) | 223 | Fat (%DM) | 3.7 | <input checked="" type="radio"/> | |
| CP (%DM) | 17.5 | Milk loss (l) | 0.35 | | | | |
| DM intake estimate | | <input checked="" type="radio"/> | Calcium (g) | <input checked="" type="radio"/> | Phosphorus (g) | <input checked="" type="radio"/> | |
| Max. NDF intake% | 100 | Supply | 115.6 | Supply | 91.8 | | |
| Maximum DMI% | 93 | Demand | 114.5 | Demand | 64.8 | | |
| DMI as % liveweight | 3.6 | Balance | 1.1 | Balance | 27.0 | | |
| Active recommended levels | | <input type="radio"/> One | <input type="radio"/> Four | Magnesium (g) | <input checked="" type="radio"/> | DCAD | <input checked="" type="radio"/> |
| | | <input checked="" type="radio"/> Two | <input type="radio"/> Five | Supply | 48.3 | Calculated | - |
| | | <input type="radio"/> Three | <input type="radio"/> Off | Demand | 34.1 | Recommended | >250 |
| Mid Lactation (14-18 lts) | | A | | Balance | 14.3 | | |
| | | | | | | Rumen pH | 6.1 |

Case study 6-1
Possible solution

Feed costs

| | |
|-----------|-------|
| KES/t DM | 37910 |
| KES/MJ ME | 3.4 |
| KES/kg CP | 216 |
| KES/cow/d | 676 |

Milk income

| | |
|----------------|-----|
| KES/L raw milk | 35 |
| KES/kg ECM | 37 |
| KES/kg F+P | 515 |
| KES/cow/d | 875 |

Feed efficiency

| | |
|-------------------|-----|
| kg ECM/kg DM | 1.3 |
| g F+P/kg DM | 95 |
| Feed % income | 77 |
| KES Milk/KES Feed | 1.3 |

Margin

| | |
|------------------|------|
| KES/cow/d | 199 |
| KES/herd/d | 598 |
| Milk yield (l/d) | 25.0 |





Case study 6-2

Case study 6-2

- A farmer has 8 cross-bred cows under a zero-grazing system (0.5 km)
Formulate a ration using Rumen8
- Mean cow LW 450 kg; LWC -0.35 kg/d. 90 days in milk; 20 days in calf
- Milk production 22 litres/cow/day (milk fat 4.0%; milk protein 3.2%)
 - Milk price KES 40/litre
- The following feeds are available:

| | |
|------------------------------|-------------------|
| • Napier grass 60cm | KES 2,000/tonne |
| • Maize silage <30% DM | KES 6,000/tonne |
| • Rhodes hay high CP | KES 23,000/tonne |
| • Rapeseed meal fat <40 g/kg | KES 80,000/tonne |
| • Maize grain | KES 70,000/tonne |
| • Wheat bran | KES 29,000/tonne |
| • Minerals | KES 15,000/tonne |
| Limestone | KES 150,000/tonne |
| Maziwa (Vital) | KES 450,000/tonne |
| Dairy premix | |

| Dairy | | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|---------------------------|--|--|-------------|---|-----------|---------|-------|----------|
| Dairy cow | | Other | | | | | | |
| Live weight (kg) | | 450 | | | | | | |
| Live weight change (kg/d) | | -0.35 | | | | | | |
| Days in milk | | 90 | | | | | | |
| Days pregnant | | 20 | | | | | | |
| Number of animals in herd | | 8 | | | | | | |
| Milk yield (l/d) | | 22.0 | | | | | | |
| Milk fat (%m/v) | | 4.00 | | | | | | |
| Milk true protein (%m/v) | | 3.20 | | | | | | |
| Fat:Protein ratio | | 1.25 | | | | | | |
| Fat, Protein, F+P (kg/d) | | 0.88 | 0.7 | | | | | |
| DMI estimation method | | <input type="radio"/> Conventional <input checked="" type="radio"/> NDF intake | | | | | | |
| Farm terrain | | <input checked="" type="radio"/> Flat <input type="radio"/> Undulating <input type="radio"/> Steep | | | | | | |
| | | Distance walked (km/d) | | 0.5 | | | | |
| | | | | <input type="button" value="-"/> <input type="button" value="↑"/> <input type="button" value="↓"/> <input type="button" value="+"/> | | | | |

| | KES/t DM | KES/t as-fed |
|--------------------------------------|----------|--------------|
| Maize silage DM < 30% | 22901 | 6000 |
| Napier fresh 60 cm | 9615 | 2000 |
| Rhodes hay High CP (Chloris gayana) | 25989 | 23000 |
| Maize grain | 79007 | 70000 |
| Rapeseed (Canola) meal fat < 40 g/kg | 88889 | 80000 |
| Wheat bran | 32843 | 29000 |
| Minerals Dairy Premix | 459184 | 450000 |
| Limestone (CaCO3) | 15000 | 15000 |
| Minerals Maziwa (Vital) | 153061 | 150000 |

| File | Edit | Animal | View | Help | Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise | |
|---------------------------|--------------------------------------|----------------|--------|--------------------|-------|------------------|-------------|------------------------|-----------|---------|-------|---------------|--|
| 1. | Napier fresh 60 cm | DM | As-fed | | | | | | | | | | |
| 2. | Maize silage DM < 30% | 4.70 | 22.60 | | | | | | | | | | |
| 3. | Rhodes hay High CP (Chloris gayana) | 3.00 | 11.45 | | | | | | | | | | |
| 4. | Rapeseed (Canola) meal fat < 40 g/kg | 0.00 | 0.00 | | | | | | | | | | |
| 5. | Maize grain | 3.60 | 4.00 | | | | | | | | | | |
| 6. | Wheat bran | 4.00 | 4.51 | | | | | | | | | | |
| 7. | Limestone (CaCO3) | 0.00 | 0.00 | | | | | | | | | | |
| 8. | Minerals Maziwa (Vital) | 0.10 | 0.10 | | | | | | | | | | |
| 9. | Minerals Dairy Premix | 0.00 | 0.00 | | | | | | | | | | |
| 10. | | 0.01 | 0.01 | | | | | | | | | | |
| 11. | | 0.00 | 0.00 | | | | | | | | | | |
| 12. | | 0.00 | 0.00 | | | | | | | | | | |
| 13. | | 0.00 | 0.00 | | | | | | | | | | |
| 14. | | 0.00 | 0.00 | | | | | | | | | | |
| 15. | | 0.00 | 0.00 | | | | | | | | | | |
| Total daily intake (kg/d) | | 15.4 | 42.7 | | | | | | | | | | |
| Feed costs | | | | Milk income | | | | Feed efficiency | | | | Margin | |
| KES/t DM | 49060 | KES/L raw milk | 40 | kg ECM/kg DM | 1.4 | KES/cow/d | 124 | | | | | | |
| KES/MJ ME | 4.4 | KES/kg ECM | 40 | g F+P/kg DM | 103 | KES/herd/d | 992 | | | | | | |
| KES/kg CP | 276 | KES/kg F+P | 556 | Feed % income | 86 | | | | | | | | |
| KES/cow/d | 756 | KES/cow/d | 880 | KES Milk/KES Feed | 1.2 | Milk yield (l/d) | 22.0 | | | | | | |

| Category | Value | Status | Category | Value | Status |
|------------------------------|-------|--------|------------------------|-------|--------|
| Metabolisable energy | 170 | Green | NDF (%DM) | 37.8 | Green |
| Supply (MJ) | 170 | | NDF (kg) | 5.819 | |
| Demand (MJ) | 170 | | peNDF (%DM) | 27.8 | Green |
| Balance (MJ) | 0 | | NDF frg (%NDF) | 74.4 | Yellow |
| Density (MJ/kg DM) | 11.0 | | NDF frg (%lw) | 0.96 | Green |
| | | | Starch (%DM) | 24.0 | Yellow |
| | | | Sugar (%DM) | 5.5 | Green |
| | | | NFC (%DM) | 32.6 | Green |
| | | | Forage : Conc | 50:50 | Green |
| | | | Ash (%DM) | 8.6 | |
| Metabolisable protein | 1869 | Yellow | RDP/UDP protein | 50.5 | Red |
| Supply (g) | 1484 | | RDP (%CP) | 50.5 | |
| Demand (g) | 385 | | UDP (%CP) | 49.5 | Yellow |
| Balance (g) | 17.8 | | Excess protein (g) | 385 | |
| CP (%DM) | | | Milk loss (l) | 0.58 | |
| | | | Enteric methane | | |
| | | | Total (g/cow) | 311 | |
| | | | Intensity (g/L) | 14.1 | |
| | | | Fat (%DM) | 3.2 | Green |
| DM intake estimate | 99 | Green | Calcium (g) | 88.8 | Red |
| Max. NDF intake% | 91 | | Supply | 88.8 | |
| Maximum DMI% | 3.4 | | Demand | 91.5 | |
| DMI as % liveweight | | | Balance | -2.7 | |
| | | | Phosphorus (g) | 70.0 | Yellow |
| | | | Supply | 70.0 | |
| | | | Demand | 51.9 | |
| | | | Balance | 18.1 | |
| | | | DCAD | - | Grey |
| | | | Calculated | - | |
| | | | Recommended | >250 | |
| | | | Rumen8 pH | 6.2 | |

Active recommended levels

One Four
 Two Five
 Three Off

Early lactation (18-22 Lt.)

Case study 6-2
Possible solution A



| | | DM | As-fed |
|-----|--------------------------------------|------|--------|
| 1. | Napier fresh 60 cm | 0.00 | 0.00 |
| 2. | Maize silage DM < 30% | 9.10 | 34.73 |
| 3. | Rhodes hay High CP (Chloris gayana) | 0.00 | 0.00 |
| 4. | Rapeseed (Canola) meal fat < 40 g/kg | 4.00 | 4.44 |
| 5. | Maize grain | 2.40 | 2.71 |
| 6. | Wheat bran | 0.00 | 0.00 |
| 7. | Limestone (CaCO3) | 0.12 | 0.12 |
| 8. | Minerals Maziwa (Vital) | 0.00 | 0.00 |
| 9. | Minerals Dairy Premix | 0.01 | 0.01 |
| 10. | | 0.00 | 0.00 |
| 11. | | 0.00 | 0.00 |
| 12. | | 0.00 | 0.00 |
| 13. | | 0.00 | 0.00 |
| 14. | | 0.00 | 0.00 |
| 15. | | 0.00 | 0.00 |

Case study 6-2 Possible solution B

Total daily intake (kg/d) 15.6 42.0

| Feed costs | | Milk income | | Feed efficiency | | Margin | |
|------------|-------|----------------|-----|-------------------|-----|------------------|------|
| KES/t DM | 48622 | KES/L raw milk | 40 | kg ECM/kg DM | 1.4 | KES/cow/d | 120 |
| KES/MJ ME | 4.5 | KES/kg ECM | 40 | g F+P/kg DM | 101 | KES/herd/d | 960 |
| KES/kg CP | 312 | KES/kg F+P | 556 | Feed % income | 86 | | |
| KES/cow/d | 760 | KES/cow/d | 880 | KES Milk/KES Feed | 1.2 | Milk yield (l/d) | 22.0 |

| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|------------------------------|------|----------------------------------|----------------------------------|------------------------|----------------------------------|-------|----------|
| Metabolisable energy | | <input checked="" type="radio"/> | | | | | |
| Supply (MJ) | 171 | NDF (%DM) | 37.3 | Starch (%DM) | 22.9 | | |
| Demand (MJ) | 170 | NDF (kg) | 5.826 | Sugar (%DM) | 3.4 | | |
| Balance (MJ) | 0 | peNDF (%DM) | 25.6 | NFC (%DM) | 38.1 | | |
| Density (MJ/kg DM) | 10.9 | NDF frg (%NDF) | 75.9 | Forage : Conc | 59:41 | | |
| | | NDF frg (%lw) | 0.98 | Ash (%DM) | 6.0 | | |
| Metabolisable protein | | <input checked="" type="radio"/> | | | | | |
| Supply (g) | 1503 | RDP/UDP protein | | Enteric methane | | | |
| Demand (g) | 1485 | RDP (%CP) | 61.1 | Total (g/cow) | 314 | | |
| Balance (g) | 18 | UDP (%CP) | 38.9 | Intensity (g/L) | 14.3 | | |
| CP (%DM) | 15.6 | Excess protein (g) | 18 | Fat (%DM) | 3.0 | | |
| | | Milk loss (l) | 0.03 | | | | |
| DM intake estimate | | <input checked="" type="radio"/> | | | | | |
| Max. NDF intake% | 100 | Calcium (g) | <input checked="" type="radio"/> | Phosphorus (g) | <input checked="" type="radio"/> | | |
| Maximum DMI% | 92 | Supply | 97.2 | Supply | 73.3 | | |
| DMI as % liveweight | 3.5 | Demand | 96.8 | Demand | 52.7 | | |
| | | Balance | 0.4 | Balance | 20.7 | | |
| | | Magnesium (g) | <input checked="" type="radio"/> | DCAD | <input checked="" type="radio"/> | | |
| | | Supply | 36.0 | Calculated | - | | |
| | | Demand | 28.9 | Recommended | >250 | | |
| | | Balance | 7.2 | | | | |
| | | Early lactation (18-22 lt..) | A | Rumen8 pH | 6.1 | | |

Active recommended levels

One Four
 Two Five
 Three Off





Case study 6-3

Case study 6-3 (1/2)

Explore the effects of grass cut at different stages of maturity on milk yield and margin above feed costs

- Zero-grazing, cross-bred dairy cow 400 kg. 60 days in milk, not pregnant. LW change -0.3 kg/d
- Milk fat 3.7%, milk protein 3.1%. Milk price KES 35/litre
- Grasses available (all KES 1,500 per tonne as fed)
 - Setaria grass late vegetative
 - Setaria grass vegetative
 - Setaria grass early vegetative

Task 1

- How many litres can the cow produce on 'Setaria grass late vegetative' and what is the margin?
- What is the DM intake as a % of LW?
- Store (S) the results on the Compare tab and give this ration the name 'Setaria grass late vegetative'

Case study 6-3 (2/2)

Task 2

- How many litres can the cow produce on ‘Setaria grass vegetative’ and what is the margin?
- What is the DM intake as a % of LW?
- Save the results on the Compare tab and give this ration the name ‘Setaria grass vegetative’

Task 3

- How many litres can the cow produce on ‘Setaria grass early vegetative’ and what is the margin?
- What is the DM intake as a % of LW?
- Save the results on the Compare tab and give this ration the name ‘Setaria early vegetative’

Dairy Diet Diet detail Price Feed cost Compare Notes Optimise

Dairy cow Other

Live weight (kg) 400

Live weight change (kg/d) -0.30

Days in milk 60

Days pregnant 0

Number of animals in herd 1

Milk yield (l/d) 3.70

Milk fat (%m/v) 3.70

Milk true protein (%m/v) 3.10

Fat:Protein ratio 1.19

Fat, Protein, F+P (kg/d) Energy corrected milk

DMI estimation method Conventional NDF intake

Farm terrain Distance walked (km/d) 0.5

Flat Undulating Steep

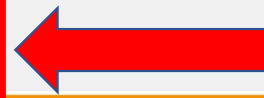
| | KES/t DM | KES/t as-fed |
|-----------------------------------|----------|--------------|
| 1. Setaria grass Late Vegetative | 3659 | 1500 |
| 2. Setaria grass Vegetative | 6494 | 1500 |
| 3. Setaria grass Early vegetative | 10345 | 1500 |
| 4. Limestone (CaCO3) | 15000 | 15000 |

| File | Edit | Animal | View | Help | Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|------|----------------------------------|----------|---------------|------|------------------------------|------------------------|-------------|------------------------|-----------|---------|-------|----------|
| 1. | Setaria grass Late Vegetative | DM: 0.00 | As-fed: 0.00 | | Metabolisable energy | NDF (%DM) | 72.9 | Starch (%DM) | 1.0 | | | |
| 2. | Setaria grass Vegetative | DM: 7.10 | As-fed: 30.74 | | Supply (MJ) | NDF (kg) | 5.176 | Sugar (%DM) | 5.0 | | | |
| 3. | Setaria grass Early vegetative | DM: 0.00 | As-fed: 0.00 | | Demand (MJ) | peNDF (%DM) | 69.3 | NFC (%DM) | 3.5 | | | |
| 4. | Limestone (CaCO3) | DM: 0.00 | As-fed: 0.00 | | Balance (MJ) | NDF frg (%NDF) | 100.0 | Forage : Conc | 100:0 | | | |
| 5. | | DM: 0.00 | As-fed: 0.00 | | Density (MJ/kg DM) | NDF frg (%lw) | 1.29 | Ash (%DM) | 10.1 | | | |
| 6. | | DM: 0.00 | As-fed: 0.00 | | Metabolisable protein | RDP/UDP protein | | Enteric methane | | | | |
| 7. | | DM: 0.00 | As-fed: 0.00 | | Supply (g) | RDP (%CP) | 78.6 | Total (g/cow) | 279 | | | |
| 8. | | DM: 0.00 | As-fed: 0.00 | | Demand (g) | UDP (%CP) | 21.4 | Intensity (g/L) | 96.3 | | | |
| 9. | | DM: 0.00 | As-fed: 0.00 | | Balance (g) | Excess protein (g) | 92 | Fat (%DM) | 2.1 | | | |
| 10. | | DM: 0.00 | As-fed: 0.00 | | CP (%DM) | Milk loss (l) | 0.15 | Phosphorus (g) | | | | |
| 11. | | DM: 0.00 | As-fed: 0.00 | | DM intake estimate | Calcium (g) | | Supply | 31.2 | | | |
| 12. | | DM: 0.00 | As-fed: 0.00 | | Max. NDF intake% | Supply | 43.3 | Demand | 13.6 | | | |
| 13. | | DM: 0.00 | As-fed: 0.00 | | Maximum DMI% | Demand | 44.0 | Balance | 17.7 | | | |
| 14. | | DM: 0.00 | As-fed: 0.00 | | DMI as % liveweight | Balance | -0.7 | DCAD | | | | |
| 15. | | DM: 0.00 | As-fed: 0.00 | | | | | Calculated | 340 | | | |
| | | | | | | | | Recommended | >250 | | | |
| | | | | | | | | Rumen8 pH | 6.4 | | | |
| | Total daily intake (kg/d) | 7.1 | 30.7 | | | | | | | | | |
| | Feed costs | | | | | | | Margin | | | | |
| | KES/t DM | 6494 | | | | | | KES/cow/d | 55 | | | |
| | KES/MJ ME | 0.7 | | | | | | KES/herd/d | - | | | |
| | KES/kg CP | 57 | | | | | | | | | | |
| | KES/cow/d | 46 | | | | | | | | | | |
| | Milk income | | | | | | | | | | | |
| | KES/L raw milk | | | | | | | | | | | |
| | KES/kg ECM | | | | | | | | | | | |
| | KES/kg F+P | | | | | | | | | | | |
| | KES/cow/d | | | | | | | | | | | |

| | |
|---------------------------|-------|
| Dairy cow | Other |
| Live weight (kg) | 400 |
| Live weight change (kg/d) | -0.30 |
| Days in milk | 60 |
| Days pregnant | 0 |
| Number of animals in herd | 1 |
| Milk yield (l/d) | 2.9 |

| | |
|-------------|-----|
| yield (l/d) | 2.9 |
|-------------|-----|

Case study 6-3
Solution task 2



| | | DM | As-fed |
|---------------------------|--------------------------------|------|--------|
| 1. | Setaria grass Late Vegetative | 0.00 | 0.00 |
| 2. | Setaria grass Vegetative | 0.00 | 0.00 |
| 3. | Setaria grass Early vegetative | 9.50 | 65.52 |
| 4. | Limestone (CaCO3) | 0.12 | 0.12 |
| 5. | | 0.00 | 0.00 |
| 6. | | 0.00 | 0.00 |
| 7. | | 0.00 | 0.00 |
| 8. | | 0.00 | 0.00 |
| 9. | | 0.00 | 0.00 |
| 10. | | 0.00 | 0.00 |
| 11. | | 0.00 | 0.00 |
| 12. | | 0.00 | 0.00 |
| 13. | | 0.00 | 0.00 |
| 14. | | 0.00 | 0.00 |
| 15. | | 0.00 | 0.00 |
| Total daily intake (kg/d) | | 9.6 | 65.6 |

| Feed costs | | Milk income | |
|------------|-------|----------------|--|
| KES/t DM | 10403 | KES/L raw milk | |
| KES/MJ ME | 1.1 | KES/kg ECM | |
| KES/kg CP | 60 | KES/kg F+P | |
| KES/cow/d | 100 | KES/cow/d | |

| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|------------------------------|------|--------------------|-------|------------------------|---------|-------|----------|
| Metabolisable energy | | | | | | | |
| Supply (MJ) | 93 | NDF (%DM) | 54.2 | Starch (%DM) | 2.3 | | |
| Demand (MJ) | 93 | NDF (kg) | 5.216 | Sugar (%DM) | 7.7 | | |
| Balance (MJ) | 0 | peNDF (%DM) | 51.5 | NFC (%DM) | 14.2 | | |
| Density (MJ/kg DM) | 9.7 | NDF frg (%NDF) | 100.0 | Forage : Conc | - | | |
| | | NDF frg (%lw) | 1.30 | Ash (%DM) | 11.2 | | |
| Metabolisable protein | | | | | | | |
| Supply (g) | 824 | RDP/UDP protein | | Enteric methane | | | |
| Demand (g) | 699 | RDP (%CP) | 71.9 | Total (g/cow) | 265 | | |
| Balance (g) | 125 | UDP (%CP) | 28.1 | Intensity (g/L) | 30.1 | | |
| CP (%DM) | 17.5 | Excess protein (g) | 413 | Fat (%DM) | 2.9 | | |
| | | Milk loss (l) | 0.66 | | | | |
| DM intake estimate | | | | | | | |
| Max. NDF intake% | 100 | Calcium (g) | | Phosphorus (g) | | | |
| Maximum DMI% | 90 | Supply | 69.3 | Supply | 22.8 | | |
| DMI as % liveweight | 2.4 | Demand | 70.6 | Demand | 26.4 | | |
| | | Balance | -1.3 | Balance | -3.6 | | |
| | | | | DCAD | | | |
| | | | | Calculated | - | | |
| | | | | Recommended | >250 | | |
| | | | | Rumen8 pH | 6.3 | | |
| | | | | Margin | | | |
| | | | | KES/cow/d | 208 | | |
| | | | | KES/herd/d | - | | |
| | | | | Milk yield (l/d) | 8.8 | | |

Case study 6-3 Solution task 3

Dairy cow Other

Live weight (kg) 400

Live weight change (kg/d) -0.30

Days in milk 60

Days pregnant 0

Number of animals in herd 1

Milk yield (l/d) 8.8



A black and white cow with brown patches is standing in a grassy field. The cow is facing left. In the background, there is a wooden building with a corrugated metal roof. The sky is blue with some clouds. The text "Case study 6-4" is overlaid on the cow's body.

Case study 6-4

Case study 6-4

- Cow LW 500 kg; LW change -0.5 kg/d; 50 days in milk; not pregnant. Zero grazing 0.5 km/d
- Milk production 27 litres/cow/day (milk fat 3.7%; milk protein 3.1%).
 - Milk price KES 35/litre.
- The following feeds are available
 - Maize silage 30-35% Dry Matter: KES 6,000/tonne
 - Rhodes hay High CP: KES 23,000/tonne
- Formulate a diet using the two forages listed with concentrates of your choice
- Create a dairy meal mix

Dairy cow Holstein

Live weight (kg) 500

Live weight change (kg/d) -0.50

Days in milk 50

Days pregnant 0

Number of animals in herd 1

Milk yield (l/d) 27.0

Milk fat (%m/v) 3.70

Milk true protein (%m/v) 3.10

Fat:Protein ratio 1.19

Fat, Protein, F+P (kg/d) 1.00 0.84 1.84 25.8 kg/d

DMI estimation method Conventional NDF intake

Farm terrain Distance walked (km/d) 0.5

Flat Undulating Steep

| | KES/t DM | KES/t as-fed |
|--|----------|--------------|
| Maize silage DM \leq 30-35% | 17910 | 6000 |
| Rhodes hay High CP (Chloris gayana) | 28049 | 23000 |
| Dairy Meal High Yield | 58427 | 52000 |
| Dairy Meal Standard | 47831 | 43000 |
| Cottonseed meal decorticated | 69307 | 63000 |
| Maize grain | 79007 | 70000 |
| Limestone (CaCO ₃) | 15000 | 15000 |

Case study 6-4 Option 1

| File | Edit | Animal | View | Help | DM | As-fed |
|---------------------------|-------------------------------------|--------|------|------|------|--------|
| 1. | Maize silage DM <> 30-35% | | | | 7.80 | 23.28 |
| 2. | Rhodes hay High CP (Chloris gayana) | | | | 0.00 | 0.00 |
| 3. | Dairy Meal High Yield | | | | 0.00 | 0.00 |
| 4. | Dairy Meal Standard | | | | 6.30 | 7.01 |
| 5. | Cottonseed meal decorticated | | | | 2.80 | 3.08 |
| 6. | Maize grain | | | | 0.00 | 0.00 |
| 7. | Limestone (CaCO3) | | | | 0.00 | 0.00 |
| 8. | | | | | 0.00 | 0.00 |
| 9. | | | | | 0.00 | 0.00 |
| 10. | | | | | 0.00 | 0.00 |
| 11. | | | | | 0.00 | 0.00 |
| 12. | | | | | 0.00 | 0.00 |
| 13. | | | | | 0.00 | 0.00 |
| 14. | | | | | 0.00 | 0.00 |
| 15. | | | | | 0.00 | 0.00 |
| Total daily intake (kg/d) | | | | | 16.9 | 33.4 |

| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|--|------|--------------------|-----------------|-----------------|---------|-------|----------|
| Metabolisable energy | | | | | | | |
| Supply (MJ) | 190 | NDF (kg) | 6.312 | Starch (%DM) | 21.4 | | |
| Demand (MJ) | 190 | peNDF (%DM) | 20.2 | Sugar (%DM) | 3.8 | | |
| Balance (MJ) | 0 | NDF frg (%NDF) | 54.7 | NFC (%DM) | 35.0 | | |
| Density (MJ/kg DM) | 11.3 | NDF frg (%lw) | 0.69 | Forage : Conc | 46:54 | | |
| Metabolisable protein | | | | | | | |
| Supply (g) | 1679 | RDP/UDP protein | Enteric methane | | | | |
| Demand (g) | 1683 | RDP (%CP) | 66.9 | Total (g/cow) | 319 | | |
| Balance (g) | -4 | UDP (%CP) | 33.1 | Intensity (g/L) | 11.8 | | |
| CP (%DM) | 16.2 | Excess protein (g) | 0 | Fat (%DM) | 4.6 | | |
| DM intake estimate | | | | | | | |
| Max. NDF intake% | 97 | Calcium (g) | Phosphorus (g) | | | | |
| Maximum DMI% | 96 | Supply | 97.1 | Supply | 85.1 | | |
| DMI as % liveweight | 3.4 | Demand | 95.6 | Demand | 59.2 | | |
| Active recommended levels | | | | | | | |
| <input checked="" type="radio"/> One <input type="radio"/> Four <input type="radio"/> Two <input type="radio"/> Five <input type="radio"/> Three <input type="radio"/> Off | | | | | | | |
| Early lactation (18-22 Lt. A) | | | | | | | |
| Magnesium (g) | | | | | | | |
| Supply | 46.9 | DCAD | | | | | |
| Demand | 34.0 | Calculated | - | | | | |
| Balance | 12.9 | Recommended | >250 | | | | |
| Rumen8 pH 6.0 | | | | | | | |

| Feed costs | | Milk income | | Feed efficiency | | Margin | |
|------------|-------|----------------|-----|-------------------|-----|------------------|------|
| KES/t DM | 37580 | KES/L raw milk | 35 | kg ECM/kg DM | 1.5 | KES/cow/d | 310 |
| KES/MJ ME | 3.3 | KES/kg ECM | 37 | g F+P/kg DM | 109 | KES/herd/d | - |
| KES/kg CP | 233 | KES/kg F+P | 515 | Feed % income | 67 | | |
| KES/cow/d | 635 | KES/cow/d | 945 | KES Milk/KES Feed | 1.5 | Milk yield (l/d) | 27.0 |



Case study 6-4 Option 2

| File | Edit | Animal | View | Help | DM | As-fed |
|---------------------------|-------------------------------------|--------|-------|------|----|--------|
| 1. | Maize silage DM <> 30-35% | 9.00 | 26.87 | | | |
| 2. | Rhodes hay High CP (Chloris gayana) | 0.00 | 0.00 | | | |
| 3. | Dairy Meal High Yield | 0.00 | 0.00 | | | |
| 4. | Dairy Meal Standard | 3.30 | 3.67 | | | |
| 5. | Cottonseed meal decorticated | 3.50 | 3.85 | | | |
| 6. | Maize grain | 1.00 | 1.13 | | | |
| 7. | Limestone (CaCO3) | 0.08 | 0.08 | | | |
| 8. | | 0.00 | 0.00 | | | |
| 9. | | 0.00 | 0.00 | | | |
| 10. | | 0.00 | 0.00 | | | |
| 11. | | 0.00 | 0.00 | | | |
| 12. | | 0.00 | 0.00 | | | |
| 13. | | 0.00 | 0.00 | | | |
| 14. | | 0.00 | 0.00 | | | |
| 15. | | 0.00 | 0.00 | | | |
| Total daily intake (kg/d) | | 16.9 | 35.6 | | | |

| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|--------------------------------------|----------------------------|----------------------------------|-----------------------|------------------------|-----------------------|-------|----------|
| Metabolisable energy | | <input checked="" type="radio"/> | | | | | |
| Supply (MJ) | 190 | NDF (%DM) | 36.6 | Starch (%DM) | 23.9 | | |
| Demand (MJ) | 190 | NDF (kg) | 6.176 | Sugar (%DM) | 3.3 | | |
| Balance (MJ) | 0 | peNDF (%DM) | 22.4 | NFC (%DM) | 36.8 | | |
| Density (MJ/kg DM) | 11.2 | NDF frg (%NDF) | 64.6 | Forage : Conc | 54:46 | | |
| | | NDF frg (%lw) | 0.80 | Ash (%DM) | 6.1 | | |
| Metabolisable protein | | <input checked="" type="radio"/> | | | | | |
| Supply (g) | 1699 | RDP/UDP protein | | Enteric methane | | | |
| Demand (g) | 1686 | RDP (%CP) | 64.8 | Total (g/cow) | 321 | | |
| Balance (g) | 13 | UDP (%CP) | 35.2 | Intensity (g/L) | 11.9 | | |
| CP (%DM) | 16.4 | Excess protein (g) | 13 | Fat (%DM) | 4.1 | | |
| | | Milk loss (l) | 0.02 | | | | |
| DM intake estimate | | <input checked="" type="radio"/> | | | | | |
| Max. NDF intake% | 95 | Calcium (g) | <input type="radio"/> | Phosphorus (g) | <input type="radio"/> | | |
| Maximum DMI% | 96 | Supply | 96.5 | Supply | 83.2 | | |
| DMI as % liveweight | 3.4 | Demand | 100.2 | Demand | 59.9 | | |
| | | Balance | -3.7 | Balance | 23.3 | | |
| Active recommended levels | | | | | | | |
| <input checked="" type="radio"/> One | <input type="radio"/> Four | Magnesium (g) | <input type="radio"/> | DCAD | <input type="radio"/> | | |
| <input type="radio"/> Two | <input type="radio"/> Five | Supply | 44.9 | Calculated | - | | |
| <input type="radio"/> Three | <input type="radio"/> Off | Demand | 34.2 | Recommended | >250 | | |
| Early lactation (18-22 lt.) | A | Balance | 10.7 | | | | |
| | | | | Rumen8 pH | 6.1 | | |

| Feed costs | | Milk income | | Feed efficiency | | Margin | |
|------------|-------|----------------|-----|-------------------|-----|------------------|------|
| KES/t DM | 38022 | KES/L raw milk | 35 | kg ECM/kg DM | 1.5 | KES/cow/d | 303 |
| KES/MJ ME | 3.4 | KES/kg ECM | 37 | g F+P/kg DM | 109 | KES/herd/d | - |
| KES/kg CP | 232 | KES/kg F+P | 515 | Feed % income | 68 | | |
| KES/cow/d | 642 | KES/cow/d | 945 | KES Milk/KES Feed | 1.5 | Milk yield (l/d) | 27.0 |

Case study 6-4 Option 3

| | | DM | As-fed |
|---------------|-------------------------------------|--------------------|------------------------|
| 1. | Maize silage DM <> 30-35% | 6.70 | 20.00 |
| 2. | Rhodes hay High CP (Chloris gayana) | 1.00 | 1.22 |
| 3. | Dairy Meal High Yield | 5.60 | 6.29 |
| 4. | Dairy Meal Standard | 0.00 | 0.00 |
| 5. | Cottonseed meal decorticated | 4.00 | 4.40 |
| 6. | Maize grain | 0.00 | 0.00 |
| 7. | Limestone (CaCO3) | 0.01 | 0.01 |
| 8. | | 0.00 | 0.00 |
| 9. | | 0.00 | 0.00 |
| 10. | | 0.00 | 0.00 |
| 11. | | 0.00 | 0.00 |
| 12. | | 0.00 | 0.00 |
| 13. | | 0.00 | 0.00 |
| 14. | | 0.00 | 0.00 |
| 15. | | 0.00 | 0.00 |
| Totals | | 542 g/kg DM | 17.3 kg 31.9 kg |

| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|--------------------------------------|----------------------------|----------------------------------|----------------------------------|------------------------|-----------------------|-------------|-----------------------|
| Metabolisable energy | | <input checked="" type="radio"/> | | | | | |
| Supply (MJ) | 192 | NDF (%DM) | 36.6 | Starch (%DM) | 23.5 | | |
| Demand (MJ) | 191 | NDF (kg) | 6.339 | Sugar (%DM) | 3.7 | | |
| Balance (MJ) | 0 | peNDF (%DM) | 21.6 | NFC (%DM) | 35.4 | | |
| Density (MJ/kg DM) | 11.1 | NDF frg (%NDF) | 57.9 | Forage : Conc | 45.55 | | |
| | | NDF frg (%lw) | 0.73 | | | | |
| Metabolisable protein | | <input type="radio"/> | | | | | |
| Supply (g) | 1943 | RDP/UDP protein | | Enteric methane | | | |
| Demand (g) | 1686 | RDP (%CP) | 65.3 | Total (g/cow) | 330 | | |
| Balance (g) | 258 | UDP (%CP) | 34.7 | Intensity (g/L) | 12.2 | | |
| CP (%DM) | 18.6 | Excess protein (g) | 372 | Fat (%DM) | 3.7 | | |
| | | Milk loss (l) | 0.58 | | | | |
| DM intake estimate | | <input checked="" type="radio"/> | | | | | |
| Max. NDF intake% | 98 | Calcium (g) | <input checked="" type="radio"/> | Phosphorus (g) | <input type="radio"/> | | |
| Maximum DMI% | 99 | Supply | 94.7 | Supply | 95.7 | | |
| DMI as % liveweight | 3.5 | Demand | 94.6 | Demand | 59.8 | | |
| | | Balance | 0.1 | Balance | 35.9 | | |
| Active recommended levels | | | | Magnesium (g) | <input type="radio"/> | DCAD | <input type="radio"/> |
| <input checked="" type="radio"/> One | <input type="radio"/> Four | Supply | 52.8 | Calculated | - | | |
| <input type="radio"/> Two | <input type="radio"/> Five | Demand | 34.1 | Recommended | >250 | | |
| <input type="radio"/> Three | <input type="radio"/> Off | Balance | 18.7 | | | | |
| Early lactation (18-22 lt..) | A | Ash (%DM) | 5.7 | Rumen8 pH | 6.1 | | |

Feed costs

| | |
|-----------|-------|
| KES/t DM | 43479 |
| KES/MJ ME | 3.9 |
| KES/kg CP | 234 |
| KES/cow/d | 753 |

Milk income

| | |
|----------------|-----|
| KES/L raw milk | 35 |
| KES/kg ECM | 37 |
| KES/kg F+P | 515 |
| KES/cow/d | 945 |

Feed efficiency

| | |
|-------------------|-----|
| kg ECM/kg DM | 1.5 |
| g F+P/kg DM | 106 |
| Feed % income | 80 |
| KES Milk/KES Feed | 1.3 |

Margin

| | |
|------------------|------|
| KES/cow/d | 192 |
| KES/herd/d | - |
| Milk yield (l/d) | 27.0 |





Case study 6-5

Case study 6-5

- A farmer has 10 Friesian cows in mid lactation under zero-grazing (0.5 km/d)
Formulate a ration using Rumen8
- Cow LW 550 kg – liveweight change unknown
- 150 days in milk and 70 days in calf
- Milk production 20 litres/cow/day (milk fat 3.7%; milk protein 3.1%).
 - Milk price KES 30/litre.
- The following feeds are fed

| | | |
|---------------------------|--------|------------------|
| • Maize silage <>30-35%DM | 15 kg | KES 6,000/tonne |
| • Dairy meal standard | 6 kg | KES 43,000/tonne |
| • Rhodes hay low CP | 3 kg | KES 23,000/tonne |
| • Lucerne hay | 5 kg | KES 23,000/tonne |
| • Dicalcium phosphate | 0.1 kg | KES 25,000/tonne |
- Suggest ways how this farmer can improve the diet and margin above feed costs

Dairy cow
Holstein

Live weight (kg)
550

Live weight change (kg/d)
0

Days in milk
150

Days pregnant
0

Number of animals in herd
10

Milk yield (l/d)
20.0

Milk fat (%m/v)
3.70

Milk true protein (%m/v)
3.10

Fat:Protein ratio
1.19

Fat, Protein, F+P (kg/d)
0.74 0.62 1.36

DMI estimation method

 Conventional NDF intake

Farm terrain
Distance walked (km/d)
0.5

Flat Undulating Steep

| | KES/t DM | KES/t as-fed |
|------------------------------------|----------|--------------|
| Maize silage DM <=> 30-35% | 17910 | 6000 |
| Dairy Meal Standard | 47831 | 43000 |
| Rhodes hay Low CP (Chloris gayana) | 25901 | 23000 |
| Lucerne hay | 25814 | 23000 |
| Dicalcium phosphate | 25773 | 25000 |

Energy corrected milk
19.1 kg/d

File Edit Animal View Help

| | | DM | As-fed |
|---------------------------|------------------------------------|------|--------|
| 1. | Maize silage DM <> 30-35% | 5.03 | 15.00 |
| 2. | Dairy Meal Standard | 5.39 | 6.00 |
| 3. | Rhodes hay Low CP (Chloris gayana) | 2.66 | 3.00 |
| 4. | Lucerne hay | 4.46 | 5.00 |
| 5. | Dicalcium phosphate | 0.10 | 0.10 |
| 6. | | 0.00 | 0.00 |
| 7. | | 0.00 | 0.00 |
| 8. | | 0.00 | 0.00 |
| 9. | | 0.00 | 0.00 |
| 10. | | 0.00 | 0.00 |
| 11. | | 0.00 | 0.00 |
| 12. | | 0.00 | 0.00 |
| 13. | | 0.00 | 0.00 |
| 14. | | 0.00 | 0.00 |
| 15. | | 0.00 | 0.00 |
| Total daily intake (kg/d) | | 17.6 | 29.1 |

| Feed costs | | Milk income | |
|------------|-------|----------------|-----|
| KES/t DM | 30301 | KES/L raw milk | 30 |
| KES/MJ ME | 3.1 | KES/kg ECM | 31 |
| KES/kg CP | 251 | KES/kg F+P | 441 |
| KES/cow/d | 535 | KES/cow/d | 600 |

Dairy Diet Diet detail Price Feed cost Compare Notes Optimise

Metabolisable energy ● **NDF (%DM)** 46.0 ● **Starch (%DM)** 15.6 ●

Supply (MJ) 173 NDF (kg) 8.120 Sugar (%DM) 3.7 ●

Demand (MJ) 173 peNDF (%DM) 34.4 ● NFC (%DM) 29.5 ●

Balance (MJ) 1 NDF frg (%NDF) 78.2 ● Forage : Conc 69:31 ●

Density (MJ/kg DM) 9.8 NDF frg (%lw) 1.15 ● Ash (%DM) 8.8

Metabolisable protein ● **RDP/UDP protein** **Enteric methane**

Supply (g) 1219 RDP (%CP) 74.6 ● Total (g/cow) 363

Demand (g) 1460 UDP (%CP) 25.4 ● Intensity (g/L) 18.1

Balance (g) -240 ● Milk loss (l) 0.00 Fat (%DM) 3.6 ●

CP (%DM) 12.1

DM intake estimate ● **Calcium (g)** ● **Phosphorus (g)** ●

Max. NDF intake% 114 Supply 172.4 Supply 78.8

Maximum DMI% 97 Demand 102.8 Demand 55.2

DMI as % livewt balance 23.6

Active recommen

One

Two

Three

Mid Lactation (14

Live weight (kg) 550

Live weight change (kg/d) -0.15

Days in milk 150

Days pregnant 0

Number of animals in herd 10

Milk yield (l/d) 20.0

Milk fat (%m/v) 3.70

Milk true protein (%m/v) 3.10

CAD

calculated -

recommended >250

umen8 pH 6.3

margin

ES/cow/d 65

ES/herd/d 655

Milk yield (l/d) 20.0

Case study 6-5
Base scenario



| | | DM | As-fed |
|----------------------------------|------------------------------------|-------------|-------------|
| 1. | Maize silage DM <> 30-35% | 11.50 | 34.33 |
| 2. | Dairy Meal Standard | 0.00 | 0.00 |
| 3. | Rhodes hay Low CP (Chloris gayana) | 0.00 | 0.00 |
| 4. | Lucerne hay | 2.20 | 2.47 |
| 5. | Dicalcium phosphate | 0.00 | 0.00 |
| 6. | Cottonseed meal decorticated | 3.00 | 3.30 |
| 7. | Limestone (CaCO3) | 0.13 | 0.13 |
| 8. | | 0.00 | 0.00 |
| 9. | | 0.00 | 0.00 |
| 10. | | 0.00 | 0.00 |
| 11. | | 0.00 | 0.00 |
| 12. | | 0.00 | 0.00 |
| 13. | | 0.00 | 0.00 |
| 14. | | 0.00 | 0.00 |
| 15. | | 0.00 | 0.00 |
| Total daily intake (kg/d) | | 16.8 | 40.2 |

| Feed costs | | Milk income | |
|------------|-------|----------------|-----|
| KES/t DM | 28083 | KES/L raw milk | 30 |
| KES/MJ ME | 2.7 | KES/kg ECM | 31 |
| KES/kg CP | 186 | KES/kg F+P | 441 |
| KES/cow/d | 473 | KES/cow/d | 600 |

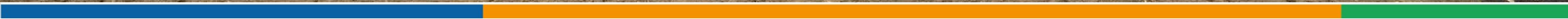
| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|--|------|--------------------|-------|-----------------|---------|-------|----------|
| Metabolisable energy | | | | | | | |
| Supply (MJ) | 177 | NDF (%DM) | 41.3 | Starch (%DM) | 19.5 | | |
| Demand (MJ) | 177 | NDF (kg) | 6.953 | Sugar (%DM) | 2.8 | | |
| Balance (MJ) | 0 | peNDF (%DM) | 31.5 | NFC (%DM) | 34.6 | | |
| Density (MJ/kg DM) | 10.5 | NDF frg (%NDF) | 87.9 | Forage : Conc | 82:18 | | |
| | | NDF frg (%lw) | 1.11 | Ash (%DM) | 5.9 | | |
| Metabolisable protein | | | | | | | |
| Supply (g) | 1461 | RDP/UDP protein | | Enteric methane | | | |
| Demand (g) | 1460 | RDP (%CP) | 68.9 | Total (g/cow) | 347 | | |
| Balance (g) | 0 | UDP (%CP) | 31.1 | Intensity (g/L) | 17.3 | | |
| CP (%DM) | 15.1 | Excess protein (g) | 0 | Fat (%DM) | 3.1 | | |
| | | Milk loss (l) | <0.01 | | | | |
| DM intake estimate | | | | | | | |
| Max. NDF intake% | 97 | Calcium (g) | | Phosphorus (g) | | | |
| Maximum DMI% | 93 | Supply | 114.8 | Supply | 67.4 | | |
| DMI as % liveweight | 3.1 | Demand | 120.3 | Demand | 57.1 | | |
| | | Balance | -5.5 | Balance | 10.3 | | |
| Magnesium (g) | | | | | | | |
| Active recommended levels | | | | | | | |
| <input type="radio"/> One <input type="radio"/> Four <input checked="" type="radio"/> Two <input type="radio"/> Five <input type="radio"/> Three <input type="radio"/> Off | | | | | | | |
| Mid Lactation (14-18 lts) <input type="checkbox"/> A | | | | | | | |
| Live weight (kg) | 550 | Calculated | - | DCAD | | | |
| Live weight change (kg/d) | 0.07 | Recommended | >250 | | | | |
| Days in milk | 150 | pen8 pH | 6.2 | | | | |
| Days pregnant | 0 | | | | | | |
| Number of animals in herd | 10 | | | | | | |
| Milk yield (l/d) | 20.0 | | | | | | |
| Milk fat (%m/v) | 3.70 | | | | | | |
| Milk true protein (%m/v) | 3.10 | | | | | | |
| Milk yield (l/d) | 20.0 | | | | | | |

Case study 6-5
Alternative





Case study 6-6



Case study 6-6

- A farmer has 30 cross-bred cows in mid lactation
- Cow LW 450 kg; liveweight change unknown.
- 150 days in milk and 70 days in calf
- Milk production 12 litres/cow/day (milk fat 3.7%; milk protein 3.1%).
 - Milk price KES 30/litre.
- Cows are grazing 4 ha (10 acres) of star grass (Naivasha) pastures for 4 hours per day
KES 1,000/tonne
- The following supplements are fed

| | | |
|------------------------------------|------|------------------|
| • Napier grass fresh 2 meters tall | 4 kg | KES 2,000/tonne |
| • Oat straw | 3 kg | KES 15,000/tonne |
| • Dairy meal standard | 7 kg | KES 43,000/tonne |
- Suggest ways how this farmer can improve the diet and margin above feed costs

Dairy cow Other

Live weight (kg)

Live weight change (kg/d)

Days in milk

Days pregnant

Number of animals in herd

Milk yield (l/d)

Milk fat (%m/v)

Milk true protein (%m/v)

Fat:Protein ratio 1.19

Fat, Protein, F+P (kg/d) 0.44 0.37 0.82

DMI estimation method Conventional NDF intake

Farm terrain Flat Undulating Steep

Distance walked (km/d)

| | KES/t DM | KES/t as-fed |
|------------------------------|------------------------------------|------------------------------------|
| Star grass fresh (Naivasha) | <input type="text" value="3268"/> | <input type="text" value="1000"/> |
| Napier fresh mature > 120 cm | <input type="text" value="8584"/> | <input type="text" value="2000"/> |
| Oats forage straw | <input type="text" value="16502"/> | <input type="text" value="15000"/> |
| Dairy Meal Standard | <input type="text" value="47831"/> | <input type="text" value="43000"/> |

Energy corrected milk
11.5 kg/d

| File | Edit | Animal | View | Help | Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|---------------------------|------------------------------|--------------------|--------|------------------------|------------------------------|----------------------------------|---------------------------|----------------------------------|----------------------------------|----------------------------------|-----------------------|----------------------------------|
| 1. | Star grass fresh (Naivasha) | DM | As-fed | | Metabolisable energy | <input checked="" type="radio"/> | NDF (%DM) | 52.7 | <input checked="" type="radio"/> | Starch (%DM) | 10.8 | <input checked="" type="radio"/> |
| 2. | Napier fresh mature > 120 cm | 0.93 | 4.00 | | Supply (MJ) | 133 | NDF (kg) | 7.140 | | Sugar (%DM) | 2.9 | <input checked="" type="radio"/> |
| 3. | Oats forage straw | 2.73 | 3.00 | | Demand (MJ) | 132 | peNDF (%DM) | 38.8 | <input checked="" type="radio"/> | NFC (%DM) | 23.1 | <input checked="" type="radio"/> |
| 4. | Dairy Meal Standard | 6.29 | 7.00 | | Balance (MJ) | 1 | NDF frg (%NDF) | 71.0 | <input checked="" type="radio"/> | Forage : Conc | 54:46 | <input checked="" type="radio"/> |
| 5. | Urea | 0.00 | 0.00 | | Density (MJ/kg DM) | 9.8 | NDF frg (%lw) | 1.13 | <input checked="" type="radio"/> | Ash (%DM) | 9.5 | |
| 6. | | 0.00 | 0.00 | | Metabolisable protein | <input checked="" type="radio"/> | RDP/UDP protein | | | Enteric methane | | |
| 7. | | 0.00 | 0.00 | | Supply (g) | 890 | RDP (%CP) | 71.8 | <input checked="" type="radio"/> | Total (g/cow) | 309 | |
| 8. | | 0.00 | 0.00 | | Demand (g) | 1008 | UDP (%CP) | 28.2 | <input checked="" type="radio"/> | Intensity (g/L) | 25.7 | |
| 9. | | 0.00 | 0.00 | | Balance (g) | -119 | Milk loss (l) | 0.00 | | Fat (%DM) | 3.8 | <input checked="" type="radio"/> |
| 10. | | 0.00 | 0.00 | | CP (%DM) | 10.9 | DM intake estimate | <input checked="" type="radio"/> | Calcium (g) | <input checked="" type="radio"/> | Phosphorus (g) | <input checked="" type="radio"/> |
| 11. | | 0.00 | 0.00 | | Max. NDF intake% | 122 | Maximum DMI% | 99 | Demand | 70.3 | Supply | 48.2 |
| 12. | | 0.00 | 0.00 | | DMI as % liveweight | 3.0 | Demand | 70.3 | Balance | 23.1 | Demand | 38.3 |
| 13. | | 0.00 | 0.00 | | | | Balance | 23.1 | Balance | 9.9 | Balance | 9.9 |
| 14. | | 0.00 | 0.00 | | Active recommended levels | | Magnesium (g) | <input checked="" type="radio"/> | DCAD | <input checked="" type="radio"/> | Calculated | - |
| 15. | | 0.00 | 0.00 | | <input type="radio"/> One | | Supply | 34.0 | Demand | 20.0 | Recommended | >250 |
| | | | | | <input type="radio"/> Two | | Demand | 20.0 | Balance | 14.0 | Rumen8 pH | 6.3 |
| | | | | | <input type="radio"/> Three | | Balance | 14.0 | | | | |
| | | | | | <input type="radio"/> Four | | | | | | | |
| | | | | | <input type="radio"/> Five | | | | | | | |
| | | | | | <input type="radio"/> Off | | | | | | | |
| | | | | | Mid Lactation (14-18 lts) | A | | | | | | |
| Total daily intake (kg/d) | | 13.6 | 25.8 | | | | | | | | | |
| Feed costs | | Milk income | | Feed efficiency | | Margin | | | | | | |
| KES/t DM | 26968 | KES/L raw milk | 30 | kg ECM/kg DM | 0.8 | KES/cow/d | -6 | | | | | |
| KES/MJ ME | 2.8 | KES/kg ECM | 31 | g F+P/kg DM | 60 | KES/herd/d | -171 | | | | | |
| KES/kg CP | 247 | KES/kg F+P | 441 | Feed % income | 102 | | | | | | | |
| KES/cow/d | 366 | KES/cow/d | 360 | KES Milk/KES Feed | 1.0 | Milk yield (l/d) | 12.0 | | | | | |

Case study 6-6 Base scenario



| | | DM | As-fed |
|---------------------------|------------------------------|------|--------|
| 1. | Star grass fresh (Naivasha) | 3.61 | 11.80 |
| 2. | Napier fresh mature > 120 cm | 0.93 | 4.00 |
| 3. | Oats forage straw | 2.73 | 3.00 |
| 4. | Dairy Meal Standard | 6.29 | 7.00 |
| 5. | Urea | 0.09 | 0.10 |
| 6. | | 0.00 | 0.00 |
| 7. | | 0.00 | 0.00 |
| 8. | | 0.00 | 0.00 |
| 9. | | 0.00 | 0.00 |
| 10. | | 0.00 | 0.00 |
| 11. | | 0.00 | 0.00 |
| 12. | | 0.00 | 0.00 |
| 13. | | 0.00 | 0.00 |
| 14. | | 0.00 | 0.00 |
| 15. | | 0.00 | 0.00 |
| Total daily intake (kg/d) | | 13.7 | 25.9 |

| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|--------------------------------------|----------------------------|--------------------------------|-------|-----------|---------|-------|----------|
| Metabolisable energy | | | | | | | |
| Supply (MJ) | 133 | | | | | | |
| Demand (MJ) | 133 | | | | | | |
| Balance (MJ) | 0 | | | | | | |
| Density (MJ/kg DM) | 9.7 | | | | | | |
| Metabolisable protein | | | | | | | |
| Supply (g) | 996 | | | | | | |
| Demand (g) | 998 | | | | | | |
| Balance (g) | -2 | | | | | | |
| CP (%DM) | 12.7 | | | | | | |
| DM intake estimate | | | | | | | |
| Max. NDF intake% | 122 | | | | | | |
| Maximum DMI% | 100 | | | | | | |
| DMI as % liveweight | 3.0 | | | | | | |
| Active recommended levels | | | | | | | |
| <input type="radio"/> One | <input type="radio"/> Four | | | | | | |
| <input checked="" type="radio"/> Two | <input type="radio"/> Five | | | | | | |
| <input type="radio"/> Three | <input type="radio"/> Off | | | | | | |
| Mid Lactation (14-18 lts) | | <input type="text" value="A"/> | | | | | |
| NDF (%DM) | 52.3 | | | | | | |
| NDF (kg) | 7.140 | | | | | | |
| peNDF (%DM) | 38.5 | | | | | | |
| NDF frg (%NDF) | 71.0 | | | | | | |
| NDF frg (%lw) | 1.13 | | | | | | |
| RDP/UDP protein | | | | | | | |
| RDP (%CP) | 75.8 | | | | | | |
| UDP (%CP) | 24.2 | | | | | | |
| Excess protein (g) | 31 | | | | | | |
| Milk loss (l) | 0.05 | | | | | | |
| Calcium (g) | | | | | | | |
| Supply | 93.4 | | | | | | |
| Demand | 70.2 | | | | | | |
| Balance | 23.3 | | | | | | |
| Magnesium (g) | | | | | | | |
| Supply | 34.0 | | | | | | |
| Demand | 20.0 | | | | | | |
| Balance | 14.0 | | | | | | |
| Starch (%DM) | 10.7 | | | | | | |
| Sugar (%DM) | 2.9 | | | | | | |
| NFC (%DM) | 21.8 | | | | | | |
| Forage : Conc | 53:47 | | | | | | |
| Ash (%DM) | 9.4 | | | | | | |
| Enteric methane | | | | | | | |
| Total (g/cow) | 309 | | | | | | |
| Intensity (g/L) | 25.8 | | | | | | |
| Fat (%DM) | 3.8 | | | | | | |
| Phosphorus (g) | | | | | | | |
| Supply | 48.2 | | | | | | |
| Demand | 38.4 | | | | | | |
| Balance | 9.8 | | | | | | |
| DCAD | | | | | | | |
| Calculated | - | | | | | | |
| Recommended | >250 | | | | | | |
| Rumen8 pH | 6.3 | | | | | | |

Case study 6-6
Possible solution?



| Feed costs | | Milk income | | Feed efficiency | | Margin | |
|------------|-------|----------------|-----|-------------------|-----|------------------|------|
| KES/t DM | 27488 | KES/L raw milk | 30 | kg ECM/kg DM | 0.8 | KES/cow/d | -15 |
| KES/MJ ME | 2.8 | KES/kg ECM | 31 | g F+P/kg DM | 60 | KES/herd/d | -456 |
| KES/kg CP | 217 | KES/kg F+P | 441 | Feed % income | 104 | | |
| KES/cow/d | 375 | KES/cow/d | 360 | KES Milk/KES Feed | 1.0 | Milk yield (l/d) | 12.0 |

| File | Edit | Animal | View | Help | DM | As-fed |
|---------------------------|------------------------------|--------|-------|------|----|--------|
| 1. | Star grass fresh (Naivasha) | 4.60 | 15.03 | | | |
| 2. | Napier fresh mature > 120 cm | 0.00 | 0.00 | | | |
| 3. | Oats forage straw | 0.00 | 0.00 | | | |
| 4. | Dairy Meal Standard | 7.60 | 8.45 | | | |
| 5. | | 0.00 | 0.00 | | | |
| 6. | | 0.00 | 0.00 | | | |
| 7. | | 0.00 | 0.00 | | | |
| 8. | | 0.00 | 0.00 | | | |
| 9. | | 0.00 | 0.00 | | | |
| 10. | | 0.00 | 0.00 | | | |
| 11. | | 0.00 | 0.00 | | | |
| 12. | | 0.00 | 0.00 | | | |
| 13. | | 0.00 | 0.00 | | | |
| 14. | | 0.00 | 0.00 | | | |
| 15. | | 0.00 | 0.00 | | | |
| Total daily intake (kg/d) | | 12.2 | 23.5 | | | |

| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|--|------|------------------------|---|------------------|---|------------------------|---|
| Metabolisable energy ● | | | | | | | |
| Supply (MJ) | 129 | NDF (kg) | 5.817 | NDF (%DM) | 47.7 ● | Starch (%DM) | 14.0 ● |
| Demand (MJ) | 129 | peNDF (%DM) | 29.8 ● | NDF (kg) | 5.817 | Sugar (%DM) | 3.3 ● |
| Balance (MJ) | 0 | NDF frg (%NDF) | 57.0 ● | peNDF (%DM) | 29.8 ● | NFC (%DM) | 25.0 ● |
| Density (MJ/kg DM) | 10.6 | NDF frg (%lw) | 0.74 ● | NDF frg (%NDF) | 57.0 ● | Forage : Conc | 38:62 ! |
| Metabolisable protein ● | | | | | | | |
| Supply (g) | 984 | RDP/UDP protein | | NDF frg (%lw) | 0.74 ● | Enteric methane | |
| Demand (g) | 955 | RDP (%CP) | 74.4 ● | Total (g/cow) | 275 | Total (g/cow) | 275 |
| Balance (g) | 29 | UDP (%CP) | 25.6 ● | Intensity (g/L) | 22.9 | Intensity (g/L) | 22.9 |
| CP (%DM) | 13.1 | Excess protein (g) | 33 | Fat (%DM) | 4.6 ● | Fat (%DM) | 4.6 ● |
| DM intake estimate ● | | | | | | | |
| Max. NDF intake% | 99 | Calcium (g) | | Milk loss (l) | 0.05 | Phosphorus (g) | |
| Maximum DMI% | 89 | Supply | 102.5 ● | Supply | 102.5 | Supply | 51.3 |
| DMI as % liveweight | 2.7 | Demand | 63.4 | Demand | 63.4 | Demand | 35.8 |
| Active recommended levels | | | | | | | |
| <input type="radio"/> One <input type="radio"/> Four | | Magnesium (g) | | Balance | 39.0 | Balance | 15.6 |
| <input checked="" type="radio"/> Two <input type="radio"/> Five | | Supply | 34.0 ● | Supply | 34.0 | DCAD | |
| <input type="radio"/> Three <input type="radio"/> Off | | Demand | 20.0 | Demand | 20.0 | Calculated | 49 |
| Mid Lactation (14-18 lts) <input type="text" value="A"/> | | Balance | 14.0 | Balance | 14.0 | Recommended | >250 |
| | | | | | | Rumen8 pH | 6.2 |

| Feed costs | | Milk income | | Feed efficiency | | Margin | |
|------------|-------|----------------|-----|-------------------|--|------------------|-----------------------------------|
| KES/t DM | 31028 | KES/L raw milk | 30 | kg ECM/kg DM | 0.9 | KES/cow/d | -19 |
| KES/MJ ME | 2.9 | KES/kg ECM | 31 | g F+P/kg DM | 67 | KES/herd/d | -556 |
| KES/kg CP | 236 | KES/kg F+P | 441 | Feed % income | 105 ● | | |
| KES/cow/d | 379 | KES/cow/d | 360 | KES Milk/KES Feed | 1.0 | Milk yield (l/d) | <input type="text" value="12.0"/> |

Case study 6-6
Possible solution??





Case study 6-7

Case study 6-7 (1/2)

- A large farm with stall-fed HF cows has the following forages and concentrates available
 - Maize silage <30% Dry Matter KES 6,000/tonne
 - Rhodes hay low CP KES 10,000/tonne
 - Napier grass >120 cm KES 2,000/tonne
 - Maize grain KES 70,000/tonne
 - Wheat bran KES 29,000/tonne
 - Rapeseed (Canola) meal fat <40 g/kg KES 63,000/tonne
 - Soya bean meal fat <40 g/kg KES 130,000/tonne
 - Cottonseed meal decorticated KES 63,000/tonne
 - Maize bran KES 28,000/tonne
 - Sunflower seed meal dehulled KES 40,000/tonne

Case study 6-7 (2/2)

Formulate dairy meals for the following classes of livestock using some or all of the feeds available on this farm

- Task 1: Friesian dairy cows, 550 kg LW, 100 days in milk, 20 days in calf. Milk production 22 litres/cow/day (milk fat 3.7%; milk protein 3.1%; milk price KES 35/litre)
- Task 2: Friesian dairy cows, 580 kg LW, 200 days in milk, 120 days in calf. Milk production 10 litres/cow/day (milk fat 4.0%; milk protein 3.3%; milk price KES 35/litre)
- Task 3: Dry cows, 600 kg LW, 250 days pregnant
- Task 4: Mated heifers, 350 kg LW, LW gain 0.4 kg/day, 30 days pregnant
- Task 5: Unmated heifers, 250 kg LW, LW gain 0.75 kg/day

| File | Edit | Animal | View | Help | DM | As-fed | Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|---------------------------|--------------------------------------|--------|-------|------|----|--------|-------|------|-------------|-------|-----------|---------|-------|----------|
| 1. | Maize silage DM < 30% | 7.30 | 27.86 | | | | | | | | | | | |
| 2. | Rhodes hay Low CP (Chloris gayana) | 0.00 | 0.00 | | | | | | | | | | | |
| 3. | Napier fresh mature > 120 cm | 0.00 | 0.00 | | | | | | | | | | | |
| 4. | Maize grain | 1.20 | 1.35 | | | | | | | | | | | |
| 5. | Wheat bran | 1.50 | 1.70 | | | | | | | | | | | |
| 6. | Rapeseed (Canola) meal fat < 40 g/kg | 0.00 | 0.00 | | | | | | | | | | | |
| 7. | Soyabean meal fat < 40 g/kg | 0.00 | 0.00 | | | | | | | | | | | |
| 8. | Cottonseed meal decorticated | 0.00 | 0.00 | | | | | | | | | | | |
| 9. | Maize bran | 3.60 | 4.06 | | | | | | | | | | | |
| 10. | Sunflower seed meal dehulled | 3.30 | 3.67 | | | | | | | | | | | |
| 11. | Limestone (CaCO3) | 0.14 | 0.14 | | | | | | | | | | | |
| 12. | | 0.00 | 0.00 | | | | | | | | | | | |
| 13. | | 0.00 | 0.00 | | | | | | | | | | | |
| 14. | | 0.00 | 0.00 | | | | | | | | | | | |
| Total daily intake (kg/d) | | 17.0 | 38.8 | | | | | | | | | | | |

| Metabolisable energy | NDF (%DM) | Starch (%DM) |
|----------------------|-----------|--------------|
| Supply (MJ) | 42.1 | 23.0 |
| Demand (MJ) | 7.176 | 2.8 |
| Balance (MJ) | 23.8 | 33.8 |
| Density (MJ/kg DM) | 49.4 | 43.57 |
| | 0.65 | 5.8 |

| Metabolisable protein | RDP/UDP protein | Enteric methane |
|-----------------------|-----------------|-----------------|
| Supply (g) | 70.6 | 347 |
| Demand (g) | 29.4 | 15.8 |
| Balance (g) | 0 | |
| CP (%DM) | 0.00 | 3.6 |

| DM intake estimate | Calcium (g) | Phosphorus (g) |
|---------------------|-------------|----------------|
| Max. NDF intake% | 89.6 | 78.9 |
| Maximum DMI% | 88.5 | 55.1 |
| DMI as % liveweight | 1.1 | 23.8 |

| Magnesium (g) | DCAD |
|---------------|------|
| Supply | - |
| Demand | >250 |
| Balance | 6.1 |

| Feed costs | Milk income | Feed efficiency |
|------------|----------------|-----------------|
| KES/t DM | KES/L raw milk | kg ECM/kg DM |
| KES/MJ ME | KES/kg ECM | g F+P/kg DM |
| KES/kg CP | KES/kg F+P | Feed % income |
| KES/cow/d | KES/cow/d | KES Milk/KES F |

| Active recommended levels |
|--|
| <input type="radio"/> One <input type="radio"/> Two <input type="radio"/> Three <input type="radio"/> Four <input type="radio"/> Five <input checked="" type="radio"/> Off |

| | |
|---------------------------|-------|
| Live weight (kg) | 550 |
| Live weight change (kg/d) | -0.28 |
| Days in milk | 100 |
| Days pregnant | 20 |
| Number of animals in herd | 1 |
| Milk yield (l/d) | 22.0 |
| Milk fat (%m/v) | 3.70 |
| Milk true protein (%m/v) | 3.10 |

Case study 6-7 Task 1:



| | | DM | As-fed |
|-----|--------------------------------------|------|--------|
| 1. | Maize silage DM < 30% | 0.00 | 0.00 |
| 2. | Rhodes hay Low CP (Chloris gayana) | 0.00 | 0.00 |
| 3. | Napier fresh mature > 120 cm | 5.64 | 24.21 |
| 4. | Maize grain | 0.00 | 0.00 |
| 5. | Wheat bran | 0.00 | 0.00 |
| 6. | Rapeseed (Canola) meal fat < 40 g/kg | 0.00 | 0.00 |
| 7. | Soyabean meal fat < 40 g/kg | 0.00 | 0.00 |
| 8. | Cottonseed meal decorticated | 0.00 | 0.00 |
| 9. | Maize bran | 6.87 | 7.75 |
| 10. | Sunflower seed meal dehulled | 1.85 | 2.06 |
| 11. | Limestone (CaCO3) | 0.10 | 0.10 |
| 12. | | 0.00 | 0.00 |
| 13. | | 0.00 | 0.00 |
| 14. | | 0.00 | 0.00 |
| 15. | | 0.00 | 0.00 |

| | | | |
|---------------------------|-------|--------------------|------|
| Total daily intake (kg/d) | | 14.5 | 34.1 |
| Feed costs | | Milk income | |
| KES/t DM | 24136 | KES/L raw milk | 35 |
| KES/MJ ME | 2.4 | KES/kg ECM | 35 |
| KES/kg CP | 211 | KES/kg F+P | 479 |
| KES/cow/d | 349 | KES/cow/d | 350 |

| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise | |
|------------------------------|--|----------------------------------|------------------------|----------------------------------|--------------------------|-------|----------------------------------|----------------------------------|
| Metabolisable energy | | <input checked="" type="radio"/> | NDF (%DM) | 52.2 | Starch (%DM) 18.2 | | | |
| Supply (MJ) | 144 | NDF (kg) | 7.544 | Sugar (%DM) | | | 4.2 | |
| Demand (MJ) | 144 | peNDF (%DM) | 32.7 | NFC (%DM) | | | 23.4 | |
| Balance | Total metabolisable energy supply from the diet | NDF | 50.9 | Forage : Conc | | | 39:61 ! | |
| Density (MJ/kg DM) | 10.0 | NDF frg (%lw) | 0.66 | Ash (%DM) | | | 9.2 | |
| Metabolisable protein | | <input checked="" type="radio"/> | RDP/UDP protein | Enteric methane | | | | |
| Supply (g) | 1094 | RDP (%CP) | 56.4 | Total (g/cow) | | | 344 | |
| Demand (g) | 1098 | UDP (%CP) | 43.6 | Intensity (g/L) | | | 34.4 | |
| Balance (g) | -3 | Excess protein (g) | 0 | Fat (%DM) | | | 3.8 | |
| CP (%DM) | 11.5 | Milk loss (l) | 0.00 | Phosphorus (g) | | | <input checked="" type="radio"/> | |
| DM intake estimate | | <input checked="" type="radio"/> | Calcium (g) | <input checked="" type="radio"/> | Phosphorus (g) | | | <input checked="" type="radio"/> |
| Max. NDF intake% | 100 | Supply | 72.1 | Supply | | | 59.6 | |
| Maximum DMI% | 95 | Demand | 71.4 | Demand | | | 40.6 | |
| DMI as % liveweight | 2.5 | Balance | 0.7 | Balance | | | 19.1 | |
| Active records | | Live weight (kg) | | 580 | DCAD | | | <input type="radio"/> |
| <input type="radio"/> One | | Live weight change (kg/d) | | 0.39 | Calculated | | | - |
| <input type="radio"/> Two | | Days in milk | | 200 | Recommended | | | >250 |
| <input type="radio"/> Three | | Days pregnant | | 120 | Rumen8 pH | | | 6.2 |
| | | Number of animals in herd | | 1 | Margin | | | |
| | | Milk yield (l/d) | | 10.0 | KES/cow/d | | | 1 |
| | | Milk fat (%m/v) | | 4.00 | KES/herd/d | | | - |
| | | Milk true protein (%m/v) | | 3.30 | Milk yield (l/d) | | | 10.0 |

Case study 6-7

Task 2:



| | | DM | As-fed |
|-----|--------------------------------------|------|--------|
| 1. | Maize silage DM < 30% | 0.00 | 0.00 |
| 2. | Rhodes hay Low CP (Chloris gayana) | 0.00 | 0.00 |
| 3. | Napier fresh mature > 120 cm | 6.20 | 26.61 |
| 4. | Maize grain | 0.00 | 0.00 |
| 5. | Wheat bran | 0.00 | 0.00 |
| 6. | Rapeseed (Canola) meal fat < 40 g/kg | 0.00 | 0.00 |
| 7. | Soyabean meal fat < 40 g/kg | 0.00 | 0.00 |
| 8. | Cottonseed meal decorticated | 0.00 | 0.00 |
| 9. | Maize bran | 3.70 | 4.17 |
| 10. | Sunflower seed meal dehulled | 0.50 | 0.56 |
| 11. | Limestone (CaCO3) | 0.04 | 0.04 |
| 12. | | 0.00 | 0.00 |
| 13. | | 0.00 | 0.00 |
| 14. | | 0.00 | 0.00 |
| 15. | | 0.00 | 0.00 |

| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|------------------------------|--------------------------------------|----------------------------------|------------------------|----------------------------------|-----------------------------------|-----------------------|-----------------------|
| Metabolisable energy | | <input checked="" type="radio"/> | NDF (%DM) | 57.8 | Starch (%DM) | 14.2 | |
| Supply (MJ) | 95 | NDF (kg) | 6.034 | Sugar (%DM) | 4.7 | | |
| Demand (MJ) | 95 | peNDF (%DM) | 42.3 | NFC (%DM) | 20.4 | | |
| Balance (MJ) | 0 | NDF frg (%NDF) | 70.0 | Forage : Conc | 60:40 | | |
| Density (MJ/kg DM) | 9.1 | NDF frg (%lw) | 0.70 | Ash (%DM) | 10.8 | | |
| Metabolisable protein | | <input checked="" type="radio"/> | RDP/UDP protein | | Enteric methane | | |
| Supply (g) | 533 | RDP (%CP) | 56.3 | Total (g/cow) | - | | |
| Demand (g) | 528 | UDP (%CP) | 43.7 | Intensity (g/L) | - | | |
| Balance (g) | 5 | Excess protein (g) | 5 | Fat (%DM) | 3.1 | | |
| CP (%DM) | 7.9 | LWG loss (kg/d) | <0.01 | | | | |
| DM intake estimate | | <input checked="" type="radio"/> | Calcium (g) | <input checked="" type="radio"/> | Phosphorus (g) | <input type="radio"/> | |
| Max. NDF intake% | 101 | Supply | 41.9 | Supply | 36.1 | | |
| Maximum DMI% | 95 | Demand | 41.8 | Demand | 26.1 | | |
| DMI as % liveweight | 1.7 | Balance | 0.1 | Balance | 10.0 | | |
| Active recommended levels | | | | Magnesium (g) | <input type="radio"/> | DCAD | <input type="radio"/> |
| <input type="radio"/> One | <input type="radio"/> Four | | | Live weight (kg) | <input type="text" value="600"/> | | |
| <input type="radio"/> Two | <input type="radio"/> Five | | | Live weight change (kg/d) | <input type="text" value="0.00"/> | | <200 |
| <input type="radio"/> Three | <input checked="" type="radio"/> Off | | | Days in milk | <input type="text" value="0"/> | | 6.3 |
| | | | | Days pregnant | <input type="text" value="250"/> | | |
| | | | | Number of animals in herd | <input type="text" value="1"/> | | |
| | | | | Milk yield (l/d) | <input type="text" value="0.0"/> | | -193 |
| | | | | Milk fat (%m/v) | <input type="text" value="0.00"/> | | - |
| | | | | Milk true protein (%m/v) | <input type="text" value="0.00"/> | | 0.0 |

Case study 6-7

Task 3:

Total daily intake (kg/d) 10.4 31.4

Feed costs

| | |
|-----------|-------|
| KES/t DM | 18471 |
| KES/MJ ME | 2.0 |
| KES/kg CP | 233 |
| KES/cow/d | 193 |

Milk income

| | |
|----------------|---|
| KES/L raw milk | 0 |
| KES/kg ECM | 0 |
| KES/kg F+P | 0 |
| KES/cow/d | 0 |

Feed efficiency

| | |
|-------------------|---|
| kg ECM/kg DM | 0 |
| g F+P/kg DM | 0 |
| Feed % income | 0 |
| KES Milk/KES Feed | 0 |



| | | DM | As-fed |
|-----|--------------------------------------|------|--------|
| 1. | Maize silage DM < 30% | 0.00 | 0.00 |
| 2. | Rhodes hay Low CP (Chloris gayana) | 0.00 | 0.00 |
| 3. | Napier fresh mature > 120 cm | 2.50 | 10.73 |
| 4. | Maize grain | 0.00 | 0.00 |
| 5. | Wheat bran | 0.00 | 0.00 |
| 6. | Rapeseed (Canola) meal fat < 40 g/kg | 0.00 | 0.00 |
| 7. | Soyabean meal fat < 40 g/kg | 0.00 | 0.00 |
| 8. | Cottonseed meal decorticated | 0.00 | 0.00 |
| 9. | Maize bran | 3.10 | 3.49 |
| 10. | Sunflower seed meal dehulled | 0.80 | 0.89 |
| 11. | Limestone (CaCO3) | 0.01 | 0.01 |
| 12. | | 0.00 | 0.00 |
| 13. | | 0.00 | 0.00 |
| 14. | | 0.00 | 0.00 |
| 15. | | 0.00 | 0.00 |

Total daily intake (kg/d) 6.4 15.1

Feed costs

| | |
|-----------|-------|
| KES/t DM | 24185 |
| KES/MJ ME | 2.4 |
| KES/kg CP | 212 |
| KES/cow/d | 155 |

Milk income

| | |
|----------------|---|
| KES/L raw milk | 0 |
| KES/kg ECM | 0 |
| KES/kg F+P | 0 |
| KES/cow/d | 0 |

Feed efficiency

| | |
|-------------------|---|
| kg ECM/kg DM | 0 |
| g F+P/kg DM | 0 |
| Feed % income | 0 |
| KES Milk/KES Feed | 0 |

| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|--|--------------------------------------|-------------|-------|-----------|---------|-------|----------|
| Metabolisable energy ● | | | | | | | |
| Supply (MJ) | 64 | | | | | | |
| Demand (MJ) | 64 | | | | | | |
| Balance (MJ) | 0 | | | | | | |
| Density (MJ/kg DM) | 10.0 | | | | | | |
| Metabolisable protein ● | | | | | | | |
| Supply (g) | 468 | | | | | | |
| Demand (g) | 450 | | | | | | |
| Balance (g) | 18 | | | | | | |
| CP (%DM) | 11.4 | | | | | | |
| DM intake estimate ● | | | | | | | |
| Max. NDF intake% | 96 | | | | | | |
| Maximum DMI% | 77 | | | | | | |
| DMI as % liveweight | 1.8 | | | | | | |
| Active recommended levels | | | | | | | |
| <input type="radio"/> One | <input type="radio"/> Four | | | | | | |
| <input type="radio"/> Two | <input type="radio"/> Five | | | | | | |
| <input type="radio"/> Three | <input checked="" type="radio"/> Off | | | | | | |
| A | | | | | | | |
| NDF (%DM) 52.4 | | | | | | | |
| NDF (kg) | 3.361 | | | | | | |
| peNDF (%DM) | 32.8 | | | | | | |
| NDF frg (%NDF) | 50.7 | | | | | | |
| NDF frg (%lw) | 0.49 | | | | | | |
| Starch (%DM) 18.4 | | | | | | | |
| Sugar (%DM) | 4.2 | | | | | | |
| NFC (%DM) | 23.7 | | | | | | |
| Forage : Conc | 39.61 | | | | | | |
| Ash (%DM) | 8.7 | | | | | | |
| RDP/UDP protein ● | | | | | | | |
| RDP (%CP) | 64.6 | | | | | | |
| UDP (%CP) | 35.4 | | | | | | |
| Excess protein (g) | 18 | | | | | | |
| LWG loss (kg/d) | <0.01 | | | | | | |
| Enteric methane | | | | | | | |
| Total (g/cow) | - | | | | | | |
| Intensity (g/L) | - | | | | | | |
| Fat (%DM) | 3.8 | | | | | | |
| Calcium (g) ● | | | | | | | |
| Supply | 20.3 | | | | | | |
| Demand | 20.6 | | | | | | |
| Balance | -0.3 | | | | | | |
| Phosphorus (g) ● | | | | | | | |
| Supply | 26.4 | | | | | | |
| Demand | 14.4 | | | | | | |
| Balance | 12.0 | | | | | | |
| Magnesium (g) ● | | | | | | | |
| Supply | 10.7 | | | | | | |
| Demand | - | | | | | | |
| Balance | - | | | | | | |
| DCAD ● | | | | | | | |
| Calculated | - | | | | | | |
| Live weight (kg) | 350 | | | | | | |
| Live weight change (kg/d) | 0.40 | | | | | | |
| Days in milk | 0 | | | | | | |
| Days pregnant | 30 | | | | | | |
| Number of animals in herd | 1 | | | | | | |
| Milk yield (l/d) | 0.0 | | | | | | |
| Milk fat (%m/v) | 0.00 | | | | | | |
| Milk true protein (%m/v) | 0.00 | | | | | | |

| | |
|---------------------------|------|
| Live weight (kg) | 350 |
| Live weight change (kg/d) | 0.40 |
| Days in milk | 0 |
| Days pregnant | 30 |
| Number of animals in herd | 1 |
| Milk yield (l/d) | 0.0 |
| Milk fat (%m/v) | 0.00 |
| Milk true protein (%m/v) | 0.00 |

Case study 6-7
Task 4:



| File | Edit | Animal | View | Help | DM | As-fed |
|---------------------------|--------------------------------------|--------|------|------|----|--------|
| 1. | Maize silage DM < 30% | 1.90 | 7.25 | | | |
| 2. | Rhodes hay Low CP (Chloris gayana) | 0.00 | 0.00 | | | |
| 3. | Napier fresh mature > 120 cm | 0.00 | 0.00 | | | |
| 4. | Maize grain | 0.00 | 0.00 | | | |
| 5. | Wheat bran | 0.00 | 0.00 | | | |
| 6. | Rapeseed (Canola) meal fat < 40 g/kg | 0.00 | 0.00 | | | |
| 7. | Soyabean meal fat < 40 g/kg | 0.00 | 0.00 | | | |
| 8. | Cottonseed meal decorticated | 0.00 | 0.00 | | | |
| 9. | Maize bran | 1.70 | 1.92 | | | |
| 10. | Sunflower seed meal dehulled | 2.00 | 2.22 | | | |
| 11. | Limestone (CaCO3) | 0.03 | 0.03 | | | |
| 12. | | 0.00 | 0.00 | | | |
| 13. | | 0.00 | 0.00 | | | |
| 14. | | 0.00 | 0.00 | | | |
| 15. | | 0.00 | 0.00 | | | |
| Total daily intake (kg/d) | | 5.6 | 11.4 | | | |

| Price | Feed cost | Compare | Notes | Optimise | |
|----------------------------------|--------------------------------------|------------------------|----------------------------------|------------------------|-----------------------|
| Metabolisable energy | <input checked="" type="radio"/> | NDF (%DM) | 42.8 | Starch (%DM) | 18.1 |
| Supply (MJ) | 61 | NDF (kg) | 2.407 | Sugar (%DM) | 3.2 |
| Demand (MJ) | 61 | peNDF (%DM) | 22.3 | NFC (%DM) | 28.3 |
| Balance (MJ) | 1 | NDF frg (%NDF) | 38.4 | Forage : Conc | 34:66 |
| Density (MJ/kg DM) | 10.9 | NDF frg (%lw) | 0.37 | Ash (%DM) | 6.0 |
| Metabolisable protein | <input checked="" type="radio"/> | RDP/UDP protein | | Enteric methane | |
| Supply (g) | 471 | RDP (%CP) | 77.7 | Total (g/cow) | - |
| Demand (g) | 475 | UDP (%CP) | 22.3 | Intensity (g/L) | - |
| Balance (g) | -4 | Excess protein (g) | 274 | Fat (%DM) | 3.6 |
| CP (%DM) | 19.3 | LWG loss (kg/d) | 0.10 | | |
| DM intake estimate | <input checked="" type="radio"/> | Calcium (g) | <input checked="" type="radio"/> | Phosphorus (g) | <input type="radio"/> |
| Max. NDF intake% | 96 | Supply | 26.6 | Supply | 30.4 |
| Maximum DMI% | 81 | Demand | 26.2 | Demand | 16.8 |
| DMI as % liveweight | 2.3 | Balance | 0.3 | Balance | 13.5 |
| Active recommended levels | | | | | |
| <input type="radio"/> One | <input type="radio"/> Four | | | | |
| <input type="radio"/> Two | <input type="radio"/> Five | | | | |
| <input type="radio"/> Three | <input checked="" type="radio"/> Off | | | | |
| Magnesium (g) | | | | | |
| Supply | | <input type="radio"/> | DCAD | <input type="radio"/> | |
| Demand | | | Live weight (kg) | 250 | |
| Balance | | | Live weight change (kg/d) | 0.75 | |
| | | | Days in milk | 0 | |
| | | | Days pregnant | 0 | |
| | | | Number of animals in herd | 1 | |
| | | | Milk yield (l/d) | 0.0 | |
| | | | Milk fat (%m/v) | 0.00 | |
| | | | Milk true protein (%m/v) | 0.00 | |
| | | | | 0.0 | |

| Feed costs | Milk income | Feed efficiency | |
|------------|-------------|-------------------|---|
| KES/t DM | 33129 | KES/L raw milk | 0 |
| KES/MJ ME | 3.0 | KES/kg ECM | 0 |
| KES/kg CP | 172 | KES/kg F+P | 0 |
| KES/cow/d | 187 | KES/cow/d | 0 |
| | | kg ECM/kg DM | |
| | | g F+P/kg DM | |
| | | Feed % income | |
| | | KES Milk/KES Feed | |

Case study 6-7
Task 5:

Live weight (kg) 250

Live weight change (kg/d) 0.75

Days in milk 0

Days pregnant 0

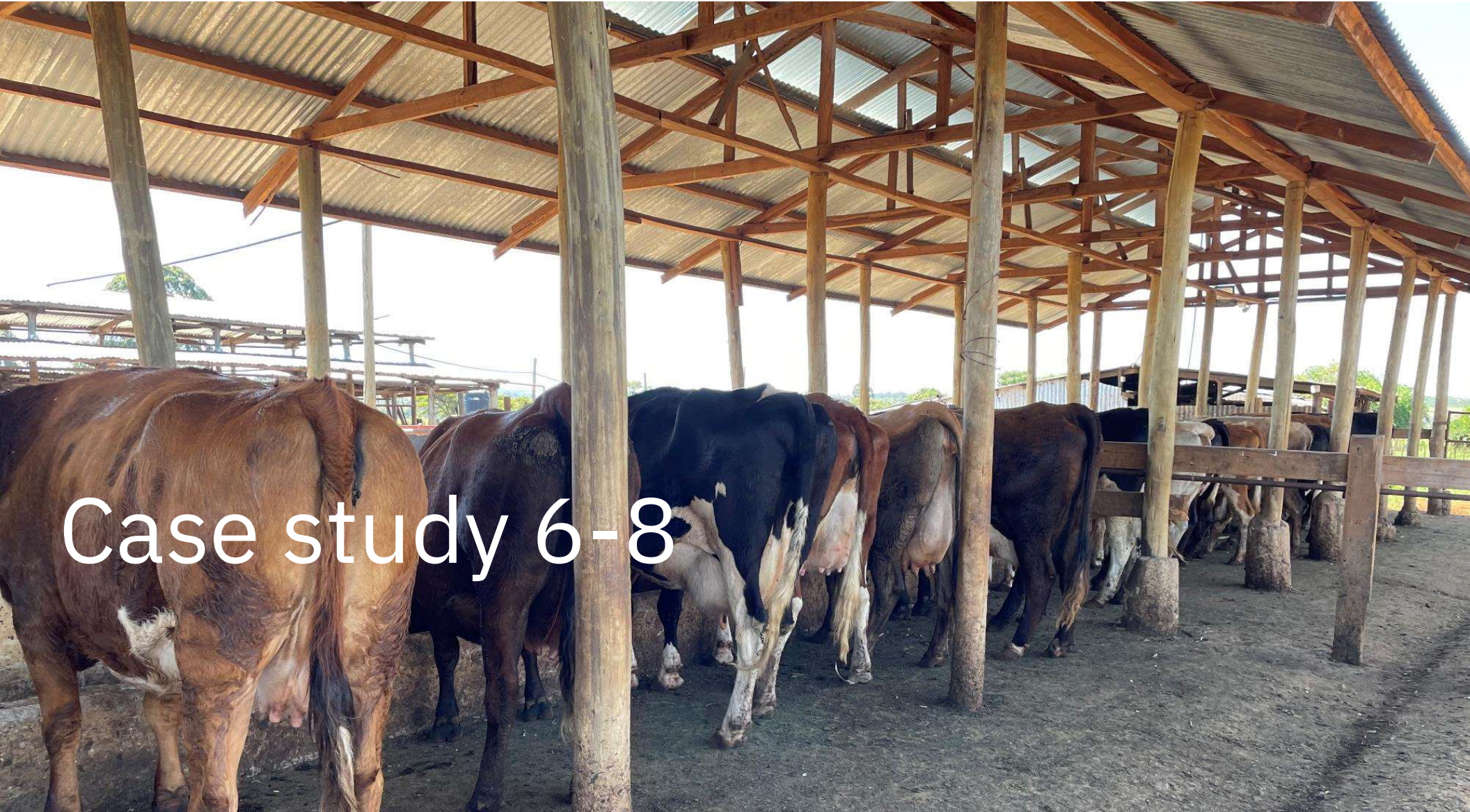
Number of animals in herd 1

Milk yield (l/d) 0.0

Milk fat (%m/v) 0.00

Milk true protein (%m/v) 0.00





Case study 6-8

Case study 6-8 (1/2)

- A farmer has 10 cross-bred cows under zero-grazing*: Cow LW 450 kg, 150 days in milk and 75 days in calf
- Milk production 15 litres/cow/day (milk fat 3.6%; milk protein 3.0%); milk price KES 40/litre.
- The following forages are available

| | | |
|--------------------------------|------------------|------------------|
| • Oats forage fresh | KES 3,000/tonne | |
| • Maize silage <30% Dry Matter | KES 6,000/tonne | |
| • Lucerne fresh | KES 10,000/tonne | Limit 8 kg/cow/d |
| • Rhodes hay low CP | KES 23,000/tonne | |
- Create a concentrate using the following ingredients (% in mix as shown)

| | | |
|--|-------------------|---------------|
| • Bone meal | KES 37,560/tonne | inclusion 2% |
| • Copra (fat <40 g/kg) | KES 40,000/tonne | inclusion 4% |
| • Cotton seed meal partly decorticated | KES 63,000/tonne | inclusion 7% |
| • Fish meal CP 535 g/kg | KES 136,000/tonne | inclusion 5% |
| • Limestone | KES 15,000/tonne | inclusion 3% |
| • Maize germ meal fat (<40 g/kg) | KES 38,000/tonne | inclusion 50% |
| • Soya bean meal (fat<40 g/kg) | KES 130,000/tonne | inclusion 2% |
| • Sunflower meal partly dehulled | KES 40,000/tonne | inclusion 7% |
| • Wheat bran | KES 29,000/tonne | inclusion 10% |
| • Wheat Pollard | KES 40,000/tonne | inclusion 10% |
| • TOTAL COST of MIX | KES50,000/tonne | |

* Zero grazing - walking 0.5 km/cow/day

Case study 6-8 (2/2)

- At the farm visit the farmer is using the following ration
 - Maize silage 18.5 kg
 - Lucerne 8 kg
 - Oats fresh 2 kg
 - Compound feed 7 kg
- Task 1: Create the concentrate mix outlined above and assess the above diet
- Task 2: If the farmer can grow any of the above forages and buy all ingredients of the compound feed separately what could be a diet giving the farmer the best milk production for the highest margin above feed cost?
- Task 3: The quality of the maize silage is low and can be improved with better practices. What would be the effect of a better-quality maize silage on milk production and margin above feed costs?

Dairy cow Holstein

Live weight (kg) 450

Live weight change (kg/d) 0.07

Days in milk 150

Days pregnant 75

Number of animals in herd 10

Milk yield (l/d) 15.0

Milk fat (%m/v) 3.60

Milk true protein (%m/v) 3.00

Fat:Protein ratio 1.20

Fat, Protein, F+P (kg/d) 0.54 0.45

DMI estimation method Conventional NDF intake

Farm terrain Flat Undulating Steep

Distance walked (km/d) 0.5

| | KES/t DM | KES/t as-fed |
|-------------------------------------|----------|--------------|
| Maize silage DM < 30% | 22901 | 6000 |
| Lucerne fresh | 40816 | 10000 |
| Oats forage fresh | 11583 | 3000 |
| ConcentrateCaseStudy6-8 | 55824 | 50000 |
| Bone Meal | 40000 | 37560 |
| Copra (coconut cake) fat < 40 gr/kg | 44793 | 40000 |
| Cottonseed meal partly decorticated | 69155 | 63000 |
| Fish meal CP < 535 g/kg | 149780 | 136000 |
| Limestone (CaCO3) | 15000 | 15000 |
| Maize germ meal fat < 40 g/kg | 42889 | 38000 |
| Soyabean meal fat < 40 g/kg | 145089 | 130000 |
| Sunflower seed meal partly dehulled | 44004 | 40000 |
| Wheat bran | 32843 | 29000 |
| Wheat pollard | 44793 | 40000 |
| Maize silage DM > 35% | 15831 | 6000 |

| Percent | Feed |
|---------|------------------------------------|
| 2.0 | Bone Meal |
| 4.0 | Copra (coconut cake) fat < 40 g... |
| 7.0 | Cottonseed meal decorticated |
| 5.0 | Fish meal CP < 535 g/kg |
| 3.0 | Limestone (CaCO3) |
| 50.0 | Maize germ meal fat < 40 g/kg |
| 2.0 | Soyabean meal fat < 40 g/kg |
| 7.0 | Sunflower seed meal partly deh... |
| 10.0 | Wheat bran |
| 10.0 | Wheat pollard |

Case study 6-8 Task 1: Concentrate mix

Diet ingredient detail

15. ConcentrateCaseStudy6-8

| Management | Mix | Comment | | | |
|----------------------------|------------------|-----------------------|------|------------------------------------|--------------|
| Protein type | Other non-forage | | | | |
| Particle size | Concentrate | | | | |
| Source | | | | | |
| DM (g/kg) | 896 | Calcium (g/kg DM) | 18.7 | NDF (g/kg DM) | 316 |
| ME (MJ/kg DM) | 11.2 | Calcium absorption | 0.60 | peNDF (g/kg DM) | 104 |
| <i>Cost (KES/MJ ME)</i> | <i>3.9</i> | Phosphorus (g/kg DM) | 12.8 | Starch (g/kg DM) | 256 |
| CP (g/kg DM) | 206 | Phosphorus absorption | 0.68 | Sugar (g/kg DM) | 32 |
| <i>Cost (KES/kg DM CP)</i> | <i>265</i> | Magnesium (g/kg DM) | 3.6 | Max feeding rate (g/kg DM) | - |
| Fat (g/kg DM) | 42 | Magnesium absorption | 0.15 | Wet density (m3) | - |
| aN | - | Potassium (g/kg DM) | 11.0 | Cost (KES/t DM) | 55824 |
| bN | - | Sulphur (g/kg DM) | 2.0 | Cost (KES/t as-fed) | 50000 |
| cN | - | Sodium (g/kg DM) | 1.9 | Losses (%) | - |
| ADIN (g/kg DM) | 1.4 | Chloride (g/kg DM) | 0.8 | <i>Cost -losses (KES/t DM)</i> | <i>55824</i> |
| Ash (g/kg DM) | 109 | DCAD (mEq/kg DM) | 33 | <i>Cost -losses (KES/t as-fed)</i> | <i>50000</i> |

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

| File | Edit | Animal | View | Help | DM | As-fed | Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|---------------------------|-------------------------------------|--------|-------|--|----------------------------|------------------------|-------|------|------------------------|-------|-----------|---------|-------|----------|
| 1. | Maize silage DM < 30% | 4.85 | 18.51 | Metabolisable energy | ● | NDF (%DM) | 39.8 | ● | Starch (%DM) | 18.9 | ● | | | |
| 2. | Lucerne fresh | 1.96 | 8.00 | Supply (MJ) | 141 | NDF (kg) | 5.409 | ● | Sugar (%DM) | 2.6 | ● | | | |
| 3. | Oats forage fresh | 0.52 | 2.01 | Demand (MJ) | 140 | peNDF (%DM) | 24.6 | ● | NFC (%DM) | 33.2 | ● | | | |
| 4. | ConcentrateCaseStudy6-8 | 6.27 | 7.00 | Balance (MJ) | 0 | NDF frg (%NDF) | 63.3 | ● | Forage : Conc | 55:45 | ● | | | |
| 5. | Bone Meal | 0.00 | 0.00 | Density (MJ/kg DM) | 10.3 | NDF frg (%lw) | 0.76 | ● | Ash (%DM) | 8.6 | ● | | | |
| 6. | Copra (coconut cake) fat < 40 gr/kg | 0.00 | 0.00 | Metabolisable protein | ● | RDP/UDP protein | | ● | Enteric methane | | | | | |
| 7. | Cottonseed meal partly decorticated | 0.00 | 0.00 | Supply (g) | 1243 | RDP (%CP) | 68.2 | ● | Total (g/cow) | 285 | | | | |
| 8. | Fish meal CP < 535 g/kg | 0.00 | 0.00 | Demand (g) | 1122 | UDP (%CP) | 31.8 | ● | Intensity (g/L) | 19.0 | | | | |
| 9. | Limestone (CaCO3) | 0.00 | 0.00 | Balance (g) | 121 | Excess protein (g) | 170 | | Fat (%DM) | 3.3 | ● | | | |
| 10. | Maize germ meal fat < 40 g/kg | 0.00 | 0.00 | CP (%DM) | 15.2 | Milk loss (l) | 0.28 | | Phosphorus (g) | ● | | | | |
| 11. | Soyabean meal fat < 40 g/kg | 0.00 | 0.00 | DM intake estimate | ● | Calcium (g) | ● | | Supply | 96.3 | | | | |
| 12. | Sunflower seed meal partly dehulled | 0.00 | 0.00 | Max. NDF intake% | 92 | Supply | 163.7 | | Demand | 43.9 | | | | |
| 13. | Wheat bran | 0.00 | 0.00 | Maximum DMI% | 92 | Demand | 76.3 | | Balance | 52.4 | | | | |
| 14. | Wheat pollard | 0.00 | 0.00 | DMI as % liveweight | 3.0 | Balance | 87.4 | | Balance | 52.4 | | | | |
| 15. | Rhodes hay Low CP (Chloris gayana) | 0.00 | 0.00 | Active recommended levels | | Magnesium (g) | ● | | DCAD | ● | | | | |
| Total daily intake (kg/d) | | 13.6 | 35.5 | <input type="radio"/> One | <input type="radio"/> Four | Supply | 35.8 | | Calculated | - | | | | |
| | | | | <input checked="" type="radio"/> Two | <input type="radio"/> Five | Demand | 23.5 | | Recommended | >250 | | | | |
| | | | | <input type="radio"/> Three | <input type="radio"/> Off | Balance | 12.3 | | Rumen8 pH | 6.1 | | | | |
| | | | | Mid Lactation (14-18 lts) <input type="text" value="A"/> | | | | | | | | | | |

Feed costs

| | |
|-----------|-------|
| KES/t DM | 40228 |
| KES/MJ ME | 3.9 |
| KES/kg CP | 265 |
| KES/cow/d | 547 |

Milk income

| | |
|----------------|--|
| KES/L raw milk | |
| KES/kg ECM | |
| KES/kg F+P | |
| KES/cow/d | |

Feed efficiency

| | |
|----------------------|------|
| Case study 6-8 | 1.0 |
| Task 1: Current farm | 0.73 |

Margin

| | |
|------------|-----|
| KES/cow/d | 53 |
| KES/herd/d | 529 |

Milk yield (l/d)



| | | DM | As-fed |
|---------------------------|-------------------------------------|------|--------|
| 1. | Maize silage DM < 30% | 0.00 | 0.00 |
| 2. | Lucerne fresh | 0.00 | 0.00 |
| 3. | Oats forage fresh | 7.50 | 28.96 |
| 4. | ConcentrateCaseStudy6-8 | 0.00 | 0.00 |
| 5. | Bone Meal | 0.00 | 0.00 |
| 6. | Copra (coconut cake) fat < 40 gr/kg | 0.00 | 0.00 |
| 7. | Cottonseed meal partly decorticated | 0.00 | 0.00 |
| 8. | Fish meal CP < 535 g/kg | 0.00 | 0.00 |
| 9. | Limestone (CaCO3) | 0.14 | 0.14 |
| 10. | Maize germ meal fat < 40 g/kg | 4.20 | 4.74 |
| 11. | Soyabean meal fat < 40 g/kg | 0.00 | 0.00 |
| 12. | Sunflower seed meal partly dehulled | 0.00 | 0.00 |
| 13. | Wheat bran | 0.00 | 0.00 |
| 14. | Wheat pollard | 1.30 | 1.46 |
| 15. | Rhodes hay Low CP (Chloris gayana) | 0.00 | 0.00 |
| Total daily intake (kg/d) | | 13.1 | 35.3 |

Feed costs

| | |
|-----------|-------|
| KES/t DM | 24912 |
| KES/MJ ME | 2.4 |
| KES/kg CP | 188 |
| KES/cow/d | 327 |

Milk income

| | |
|----------------|-----|
| KES/L raw milk | 40 |
| KES/kg ECM | 43 |
| KES/kg F+P | 606 |
| KES/cow/d | 600 |

| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|--------------------------------------|----------------------------|--------------------|-------|-----------------|---------|-------|----------|
| Metabolisable energy | | | | | | | |
| Supply (MJ) | 139 | NDF (%DM) | 44.5 | Starch (%DM) | 19.0 | | |
| Demand (MJ) | 139 | NDF (kg) | 5.844 | Sugar (%DM) | 6.6 | | |
| Balance (MJ) | 0 | peNDF (%DM) | 33.9 | NFC (%DM) | 30.1 | | |
| Density (MJ/kg DM) | 10.6 | NDF frg (%NDF) | 69.9 | Forage : Conc | 58.42 | | |
| | | NDF frg (%lw) | 0.91 | Ash (%DM) | 9.0 | | |
| Metabolisable protein | | | | | | | |
| Supply (g) | 1123 | RDP/UDP protein | | Enteric methane | | | |
| Demand (g) | 1122 | RDP (%CP) | 65.7 | Total (g/cow) | 291 | | |
| Balance (g) | 0 | UDP (%CP) | 34.3 | Intensity (g/L) | 19.4 | | |
| CP (%DM) | 13.3 | Excess protein (g) | 0 | Fat (%DM) | 3.1 | | |
| | | Milk loss (l) | <0.01 | | | | |
| DM intake estimate | | | | | | | |
| Max. NDF intake% | 100 | Calcium (g) | | Phosphorus (g) | | | |
| Maximum DMI% | 89 | Supply | 79.6 | Supply | 50.9 | | |
| DMI as % liveweight | 2.9 | Demand | 78.1 | Demand | 43.1 | | |
| | | Balance | 1.5 | Balance | 7.8 | | |
| Active recommended levels | | | | | | | |
| <input type="radio"/> One | <input type="radio"/> Four | Magnesium (g) | | DCAD | | | |
| <input checked="" type="radio"/> Two | <input type="radio"/> Five | Supply | 26.8 | Calculated | - | | |
| <input type="radio"/> Three | <input type="radio"/> Off | Demand | 23.4 | Recommended | >250 | | |
| Mid Lactation (14-18 lts) | A | Balance | 3.5 | Rumen8 pH | 6.3 | | |

Case study 6-8
Task 2

| Feed efficiency | Value |
|-------------------|-------|
| g F+P/kg DM | 1.1 |
| g F+P/kg DM | 75 |
| Feed income | 55 |
| KES Milk/KES Feed | 1.8 |

Margin

| | |
|------------|------|
| KES/cow/d | 273 |
| KES/herd/d | 2727 |

Milk yield (l/d)

| | | DM | As-fed |
|---------------------------|-------------------------------------|------|--------|
| 1. | Maize silage DM < 30% | 0.00 | 0.00 |
| 2. | Lucerne fresh | 0.00 | 0.00 |
| 3. | Oats forage fresh | 5.20 | 20.08 |
| 4. | ConcentrateCaseStudy6-8 | 0.00 | 0.00 |
| 5. | Bone Meal | 0.00 | 0.00 |
| 6. | Copra (coconut cake) fat < 40 gr/kg | 0.00 | 0.00 |
| 7. | Cottonseed meal partly decorticated | 0.00 | 0.00 |
| 8. | Fish meal CP < 535 g/kg | 0.00 | 0.00 |
| 9. | Limestone (CaCO3) | 0.00 | 0.00 |
| 10. | Maize germ meal fat < 40 g/kg | 0.00 | 0.00 |
| 11. | Soyabean meal fat < 40 g/kg | 0.00 | 0.00 |
| 12. | Sunflower seed meal partly dehulled | 1.70 | 1.87 |
| 13. | Wheat bran | 0.00 | 0.00 |
| 14. | Wheat pollard | 2.70 | 3.02 |
| 15. | Maize silage DM > 35% | 3.70 | 9.76 |
| Total daily intake (kg/d) | | 13.3 | 34.7 |

| Dairy | Diet | Diet detail | Price | Feed cost | Compare | Notes | Optimise |
|---|------|----------------------|-------|-----------------|---------|-------|----------|
| Metabolisable energy | | | | | | | |
| Supply (MJ) | 140 | NDF (%DM) | 44.1 | Starch (%DM) | 17.9 | | |
| Demand (MJ) | 139 | NDF (kg) | 5.863 | Sugar (%DM) | 6.7 | | |
| Balance (MJ) | 0 | peNDF (%DM) | 33.5 | NFC (%DM) | 31.4 | | |
| Density (MJ/kg DM) | 10.5 | NDF frg (%NDF) | 75.9 | Forage : Conc | 67:33 | | |
| | | NDF frg (%lw) | 0.99 | Ash (%DM) | 6.9 | | |
| Metabolisable protein | | | | | | | |
| Supply (g) | 1112 | RDP/UDP protein | | Enteric methane | | | |
| Demand (g) | 1109 | RDP (%CP) | 75.4 | Total (g/cow) | 291 | | |
| Balance (g) | 3 | UDP (%CP) | 24.6 | Intensity (g/L) | 19.4 | | |
| CP (%DM) | 14.3 | Excess protein (g) | 17 | Fat (%DM) | 3.3 | | |
| | | Milk loss (l) | 0.03 | | | | |
| DM intake estimate | | | | | | | |
| Max. NDF intake% | 100 | Calcium (g) | | Phosphorus (g) | | | |
| Maximum DMI% | 90 | Supply | 38.8 | Supply | 49.3 | | |
| DMI as % liveweight | 3.0 | Demand | 84.1 | Demand | 43.3 | | |
| | | Balance | -45.3 | Balance | 6.0 | | |
| Active recommended levels | | | | | | | |
| <input type="radio"/> One <input type="radio"/> Four | | Magnesium (g) | | DCAD | | | |
| <input checked="" type="radio"/> Two <input type="radio"/> Five | | Supply | | Calculated | | - | |
| <input type="radio"/> Three <input type="radio"/> Off | | Demand | | Recommended | | >250 | |
| Mid Lactation (14-18 lts) A | | Balance | | Rumen8 pH | | 6.3 | |
| | | Supply | | | | | |
| | | Demand | | | | | |
| | | Balance | | | | | |

| Feed costs | | Milk income | |
|------------|-------|----------------|-----|
| KES/t DM | 23651 | KES/L raw milk | 40 |
| KES/MJ ME | 2.2 | KES/kg ECM | 43 |
| KES/kg CP | 165 | KES/kg F+P | 606 |
| KES/cow/d | 315 | KES/cow/d | 600 |

Case study 6-8
Task 3

| Margin | |
|------------------|------|
| KES/cow/d | 285 |
| KES/herd/d | 2854 |
| Milk yield (l/d) | 15.0 |



Q & A Discussion

A photograph of several brown cows in a barn, eating hay from a long trough. A white chicken is visible in the background. The barn has a corrugated metal roof and wooden walls. The text "Ready to Rumen8!" is overlaid in orange on the lower left of the image.

Ready to Rumen8!

Course Goal

- To improve knowledge and skills of trainees so that they can confidently use the Rumen8 software application to make informed on-farm nutrition decisions to improve farm profit.
- Rumen8 is our tool to help in our decision making
- Let's go and do it!



Practice makes Perfect!

- It will take time to master the skills needed for a successful Farm Walk
- It will take time and perseverance to master the use of Rumen8
- Work with an experienced 'Rumen8 coach' to learn the 'Art of Feeding'
- This course is only a first step in that process



This brings to an end this 6-part course. We wish you good luck with 'Dairy cattle nutrition in the tropics using Rumen8'