PERITUM
AGRI INSTITUTE HARVEST THE FUTURE

Animal Production

Handout 1

Feed Tables

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Table 1: Daily nutritional requirements of sheep, NRC standards (1975)

Body mass (Kg)	Increase or Decrease (g/d)	Dry material intake (kg)	Crude protein (%)	TDN (%)	Metabolizable energy (ME)(MJ/kg)
Ewes Maintenance					
50	10	1.0	8.9	55	8.2
60	10	1.1	8.9	55	8.2
70	10	1.2	8.9	55	8.2
80	10	1.3	8.9	55	8.2
Non-lactating and first 15 weeks of pregnancy					
50	30	1.1	9.0	55	8.2
60	30	1.3	9.0	55	8.2
70	30	1.4	9.0	55	8.2
80	30	1.5	9.0	55	8.2
Last 6 weeks of pregnancy or last 8 weeks of lactation of ewes with one lamb (1)					
50	175	1.7	9.3	58	8.7
60	(+45)	1.9	9.3	58	8.7
70	180	2.1	9.3	58	8.7
80	(+45)	2.2	9.3	58	8.7
	185				
	(+45)				
	190				
	(+45)				
First 8 weeks of lactation of single lamb ewes or last 8 weeks of lactation for ewes with multiple lambs (2)					
50	-25 (+80)	2.1	10.4	65	9.7
60	-25 (+80)	2.3	10.4	65	9.7
70	-25 (+80)	2.5	10.4	65	9.7
80	-25 (+80)	2.6	10.4	65	9.7
First 8 weeks of lactation for ewes with multiple lambs					
50	-60	2.4	11.5	65	9.7
60	-60	2.6	11.5	65	9.7
70	-60	2.8	11.5	65	9.7
80	-60	3.0	11.5	65	9.7

(1) In brackets is applicable to last 8 weeks of lactation of single lamb ewes

(2) In brackets is applicable to last 8 weeks of lactation for multiple lamb ewes

Table 2: Composition of feedstuffs

Feedstuffs	Crude Protein (%)	TDN (%)	ME MJ (%)
Babala Silage (Poor)	8	57	8.5
Babala Silage (Good)	12	58	8.7
Babala Grazing	7	52	7.8
Buckwheat (Grain)	10	68	10.2
Buckwheat (Hulls)	3	41	6.1
Buckwheat (Straw)	4	38	5.7
Columbus grass hay	10	53	7.9
Eragrostis curvula hay	6	55	8.2
Eragrostis curvula hay (fertilized)	12	55	8.2
	11	61	9.1
Eragrostis curvula grazing	12	66	9.9
Barley green feed	8	50	7.5
Barley hay	10	78	11.7
Barley	10	75	11.2
Crushed maize (hominy chop)	8	70	10.4
Grain Sorghum ears	7	50	7.5
Grain Sorghum hay (with ears)	8	42	6.3
	30	70	10.4
Grain Sorghum Silage	10	80	11.9
Grain Sorghum Malt	6	56	8.4
Grain Sorghum Seed	13	63	9.4
Peanut Hay (Poor)	45	80	11.9
Peanut Hay (Good)	13	71	10.6
Peanut-Oilcake Meal	40	60	9.0
Peanut (Plants & Pods)	60	35	5.3
HPC 40 (Urea free)	14	70	10.4
HPC 60 (with urea)	5	58	8.7
Oat pastures	9	68	10.2
Oat hay	4	50	7.5
Oats	14 – 30	50	7.5
Oat straw	16	60	9.0
Chicken manure	4	44	6.6
Italian Rye grass	41	76	11.4

Cotton Seed Hulls	13	50	7.5
Cotton Seed Oil Cake	11	65	9.7
Kikuyu Hay	18	80	11.9
Kikuyu Pastures	9	75	11.2
Wheat Pastures (Young)	13	80	11.9
Wheat Pastures (5 months)	15	67	10.0
Wheat	4	45	6.7
Wheat Bran	42	85	12.7
Wheat Straw	24	70	10.4
Lupine Seed	21	60	9.0
Lucerne (Green)	11	45	6.7
Lucerne Leaves	19	55	8.4
Lucerne Hay Poor	10	45	6.7
Lucerne Hay Good	4	54	8.1
Lucerne Stems	7	69	10.3
Molasses (Cane)	13	58	8.7
Maize Cob Meal	13	78	11.7
Maize Hay (without cobs)	3	53	7.9
Maize Gluten meal	8	65	9.7
Maize Cob leaves	9	84	12.5
Maize silage (good)	6	63	9.4
Maize meal	13	56	8.4
Maize plants (with cobs)	7	45	6.7
Maize plants (dried)			
Maize plants (stook)			
Maize bran	12	65	9.7
Maize stover	4	60	7.5
Pollards	17	67	10.0
Rye Green feed	12	60	9.0
Rye Seed	13	76	11.4
Rooigras Hay (Poor)	4	50	7.5
Rooigras Hay (Good)	7	56	8.4
Sweetgrass Hay (Poor)	3	45	6.7
Sweetgrass Hay (Good)	9	56	8.4
Sweet Sioux	9	48	7.2

Sweet Sudan	7	50	7.5
Soyabean Hay (Poor)	8	42	7.8
Soyabean Hay (Good)	17	64	9.6
Soyabean Oil Cake Meal	44	78	11.6
Soyabean Seed	38	88	13.1
Sunflower Hulls	2	40	6.0
Sunflower Oil Cake Meal	38	76	11.4
Sunflower Heads	11	74	11.0
Sunflower Seed	17	80	11.9
Teff Hay (Poor)	6	50	7.5
Teff Hay (Good)	9	54	8.1
Prickly Pear leaves	2	56	8.4
Urea (NPN)	280	0	0
Veld Hay (Poor)	3	36	5.4
Veld Hay (Good)	9	59	8.8
Veld Grazing (Poor)	3	45	6.7
Veld Grazing (Good)	10	57	8.5
Fish meal	64	72	10.8
Voermol Molasses Meal	5	60	9.0

Table 3: Maximum percentage low energy roughage (7.5 MJ/Kg ME) in ration when the ration more or less provides in the energy requirements

Energy Requirement	
ME MJ/KG	PERCENTAGE ROUGHAGE
7.5	100
7.75	95
8.0	90
8.25	85
8.5	80
8.75	75
9.0	70
9.25	65
9.5	60
9.75	55
10.0	50
10.25	45
10.5	40
10.75	35
11.0	30
11.25	25
11.5	20

N.B.

When HPC 60 is used, use 5% less roughage in ration.

When using higher energy roughage e.g., Eragrostis hay, use 5% more roughage in the ration.

Step 1: What are the nutrient requirements of this sheep? Look in Table 1. Nutrient requirements of sheep.

A sheep of 50 kg in her first 8 weeks of lactation with a single lamb requires:

Crude protein requirement = 10,4 % **(1)

Energy requirement = 9,7 MJ/KG ME **(2)

Step 2: Look at the nutritive value of feedstuffs (Table 2)

Feedstuff	Crude protein content	Energy Content MJ/KG ME
Maize Stover (roughage 1)	4 ** (3)	7.5 (4)
Maize Stover (roughage 2)	- (5)	0.0 (6)
HPC (with urea) 60	60 (7)	5.3 (8)
Maize meal	9 (9)	12.5 (10)
HPC (without urea) 40	40 (11)	9.0 (12)

Step 3: Select a preliminary ration and determine its nutritive value

Total roughage content of preliminary ration (See Table 3: App A) 50%

Ratio of roughage 1: 50 % (13)

Ratio of roughage 2: -- % (14)

Ratio of HPC (6,5 of 10%)*: 6.5% (15)

Ratio of maize meal: 100 – (50(13) + .?. (14) + 6.5(15)) 43,5% (16)

Composition and nutritive value of preliminary ration A

Feedstuff		% CP
Maize Stover (roughage 1)	50 (13) ÷ 100 x 4 (3)	2.0 (17)
HPC 1 60	- (14) ÷ 100 X – (5)	0.0 (19)
Maize meal	6.5 (15) ÷ 100 X 60 (7) OR (11)	3.9 (21)
Total	43.5 (16) ÷ 100 x 9	3.92 (23)
		9.82 (25)

Feedstuff		ME MJ/KG
Maize Stover (roughage 1)	50 (13) ÷ 100 x 7.5 (4)	3.75 (18)
HPC 1 60	- (14) ÷ 100 X – (6)	0.0 (20)
Maize meal	6.5 (15) ÷ 100 X 5.3 (8) OR (12)	0.34 (22)
Total	43.5 (16) ÷ 100 x 12.5	5.44 (24)
energy		

Deficit

Crude protein deficit 10.4 (1) - 9.82 (25) = 0.58% (27)

Energy deficit 9.7 (2) - 9.53 (26) = 0.17% (28)

Step 4: Correct energy deficit of preliminary ration and test its nutritive Value %

Maize Meal replacing roughage with lowest energy content:

0.17 (28) x 100 ÷ (12.5 – 7.5 (4)) = 3.4% (29)

Quantity roughage with lower energy content 50.0 (13) – 3.4 (29) = 46.6% (30)

Quantity maize meal 43.5 (16) + 3.4 (29) = 46.9% (31)

Nutritive value of preliminary ration B

Feedstuff		% CP
Maize Stover (roughage 1)	46.6 (30) ÷ 100 x 4 (3)	1.86 (32)
Maize Stover (roughage 2)	- (14) ÷ 100 X – (5)	0.0 (19)
HPC 1 60	6.5(15)	3.90 (21)
Maize meal	46.9 (31) ÷ 100 x 9	4.22 (34)
Total		9.98 (36)
Feedstuff		ME MJ/KG
Maize Stover (roughage 1)	46.6 (30) ÷ 100 x 7.5 (4)	3.50 (33)
Maize Stover (roughage 2)	- (14) ÷ 100 X – (6)	0.0 (20)
HPC 1 60	6.5(15)	0.34 (22)
Maize meal	46.9 (31) ÷ 100 x 12.5	5.86 (35)
Total		9.70 (37)

Deficit

Crude protein deficit 10.4 (1) -9.98 (36) = 0.42% (38)

Energy deficit 9.7 (2) -9.70 (37) = 0 MJ/KG (39)

Step 5: Correct the protein of the preliminary ration and test its nutritive value % Urea free HPC replacing roughage with lowest energy content

0.42 (38) x 100 ÷ (40 (11) – 4 (3)) = 1.2% (40)

Quantity roughage with lower energy content 46.6 (30) – 1.2 (40) = 45.4% (41)

Composition and nutritive value of final ration

Feedstuff		% CP
Maize Stover (roughage 1)	45.5 (41) ÷ 100 x 4 (3)	1.82
Maize Stover (roughage 2)	- (14) ÷ 100 X – (5)	0.0 (19)
HPC 1 60	6.5(15)	3.90 (21)
Maize meal	46.9 (31)	4.22 (34)
HPC 2 (Urea free)	1.2 (40) ÷ 100 x 40 (11)	0.48
Total		10.42
Feedstuff		ME MJ/KG
Maize Stover (roughage 1)	45.5 (41) ÷ 100 x 7.5 (4)	3.41
Maize Stover (roughage 2)	- (14) ÷ 100 X – (6)	0.0 (20)
HPC 1 60	6.5(15)	0.34 (22)
Maize meal	46.9 (31)	5.86 (35)
HPC 2 (Urea free)	1.2 (40) ÷ 100 x 9 (12)	0.11
Total		9.72

Tips for the selection of a preliminary ration

Legume hay have more than 50% of roughage: Leave HPC from preliminary ration.

Legume hay only source of protein:

- Legume hay should then constitute at least 60% of the roughage.
- Legume hay replaces urea free HPC in step 5. Add calculations 14 and 40.

Hay other than legume hay:

- Include HPC in preliminary ration.
- HPC with urea, use a maximum of 6.5% HPC.
- HPC without urea, use 10% HPC.

  Preliminary estimation of energy in ration: Table shows the low energy content roughage (7.5 MJ/kg ME) in the ration with corresponding expected energy content of the ration.
- When HPC 60 is used, use 5% less roughage.
  - When higher energy content roughage (8.1 + MJ/kg ME) is used, use 5% more roughage.
  - Prevent disturbances: Roughage should preferably be not less than 40% and definitely not below 20%.
  - Protein and energy should rather be slightly over supplied rather than under supplied.
- When silage is given to sheep:
  - Calculate the ration on a dry basis.
  - Multiply the quantity (%) by three to get it on an as fed basis.
  - The ratios will then be in kg and not percentage.
  - Silage should preferably not be more than 40% of the roughage on a dry basis.