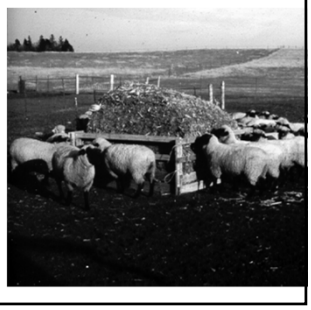
Feeding Productive Ewes

- Realistic and practical
- Facilities and equipment
- Flock size



What is the best thing to feed?

- Many would reply high quality alfalfa

Why

What is 16% grower feed?

- Feed that contains 16% crude protein.
- Is it better than 14% finisher?
- Feed tags list items on an as fed basis

What is in feeds?

- water (8-60% water)
- minerals (ash 1-4%)
- energy (TDN 40-85%)
  - forages more variable than grains
- protein (5-43%)
- vitamins

How much will sheep eat?

- Daily intakes
  - ewes 2-5% body weight
    lactating ewes have highest
  - lambs 3-6%
    goes down as lambs get heavier

Condition scoring

- Evaluating ewes for fatness
- Monitor changes
- 1-5 system
- 11% weight change equals one condition score

Nutrient Requirements

- Reading those charts

Stage of Production	Body weight	Daily gain or	Dry Matter Intake		Energy		Crude Protein	Cal-cium	Phos-phorous	Vit.	Vit.
	lb	loss	lb	%BW	TDN lb	ME Mcal	lb	grams	grams	A IU	E IU
Maintenance	125	0.02	2.3	1.8%	1.26	2.07	0.22	2.3	2.3	2800	18
	150	0.02	2.6	1.7%	1.45	2.38	0.25	2.6	2.4	3210	19
	175	0.02	2.9	1.7%	1.62	2.66	0.28	2.9	2.7	3610	20
	200	0.02	3.2	1.6%	1.79	2.94	0.31	3.2	3.0	3990	21
	225	0.02	3.5	1.6%	1.96	3.21	0.33	3.5	3.2	4360	22

Nutrient Requirements

- Using those charts
- ex. 175 ewe 1.62 TDN and .28 CP
- Alfalfa 50% TDN 1.62/.5 = 3.2 lbs.
- 3.2 X 16%CP = .51 lbs. of CP

Stages of Production

- **Maintenance**
  - **weaning until 14 days pre-breeding (138 days)**
- **Flushing/Breeding**
  - **2 weeks pre-breeding till end of breeding (49 days or more)**
- **Early/mid gestation**
  - **Completion of breeding until 4 weeks pre-lambing (80 days or more)**

Concerns During Early Mid Gestation

- **21 days of severe underfeeding**
- **80 days of moderate underfeeding**
- **Both result in smaller placenta leading to reduced birthweights**

Mid Gestation Nutrition Goals

- **Maintain condition - mature ewes**
- **Yearlings and two year olds - increase condition**
  - Higher incidence of fetal loss in young ewes.
- **Specific nutrients**
  - **Protein maybe**

    Other species - protein deficiency severely impacts placental size more than energy
- **Crop aftermath grazing - ?? protein**

Stages of Production

- Late gestation, second most important
  - singles 2 weeks
  - twins 3-4 weeks
  - triplets 4-6 weeks
- Early lactation, *most important*
  - 42 days
- Late lactation
  - 21 days
- Weaning ration
  - 7 days

Recommendations for LG Feeding

- Alfalfa hay based diets
  - Corn or other economical energy sources
  - Guideline - 1 LB. concentrate per fetus
- Limit roughage intake
  - Mature ewes with 3 fetus or more
  - All ewe lambs
- Low quality roughage as base ration require both protein and energy supplementation
- Low energy diets with poor roughage's may respond to escape protein - MLC, 1983

Late Gestation

Secretory tissue development occurs.

Larger placenta → more placenta lactogen.

Ewes with multiples have larger placenta weight.

Consequences of Underfeeding

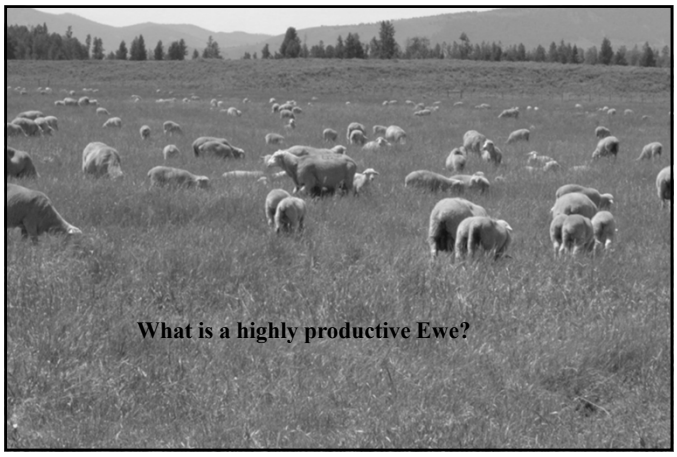
- Weak, small lambs with high mortality
- Reduced colostrum quality and quantity
- Retarded weight gain both pre & post weaning
- Reduced peak milk yield and less total production
- Decreased re-breeding success
- Reduced wool production via fewer secondary follicles

Consequences of Overfeeding

- Thin wallets
- Fat ewes
  ketosis
- Upper limit on birth weight

Factors Which Affect Milk Production

Lactation Diet Energy Status
Lactation Diet Protein Status
Late Gestation Nutrition - precaution
Ewe Fatness or Condition
Prolificacy



High producing ewes

- Twins or better
  - Moderate birth weight
- Raises them all
- 7.5 pounds of milk per day
  twins gaining .75 lb birth to weaning
- Long lived
- Breeds back if desired
- Eats like a horse

Ewe Lambs

- Lamb at 12-14 months
- Group drop rate of >1.5 w/ 200% ideal
- Produce 4 pounds of milk
  - Lamb gain on twins of .4 lb birth to weaning

Feeding Management

Separate by need

- **Singles vs twins vs triplets**
- **Age: ewe lambs vs mature**
- **Early vs late lambers**

Late Gestation Rations

175 pound ewe

	13 lb S	11.5 lbTw	9.5 lb Tr
Brome/alfalfa[a]	4	4	3
Corn	1	1.5	2.5

[a] Hay quality good, 13.9 % CP and 56% TDN

Trace mineral salt and Vitamin E

Late Gestation Rations

120 pound ewe lamb

	10 lb S	8.5 lbTw
Brome/alfalfa[a]	2	1.75
Corn	1.5	2.25

[a] Hay quality good, 13.9 % CP and 56% TDN

Trace mineral and Vitamin E

Lactation rations

175 pound ewe

	Single		Twins		Triplets	
Lamb gain	**.75**	**1**	**.5**	**.75**	**.4**	**.50**
Brome/alfalfa[a]	**5.5**	**5.5**	**5.5**	**5.5**	**5.5**	**5.0**
Corn	**.75**	**1.0**	**1.0**	**2.0**	**2.0**	**2.5**
Soybean meal		**.3**	**.3**	**.7**	**.5**	**1.0**

[a] Hay quality good, 13.9% CP and 56% TDN
Trace mineral and Vitamin E

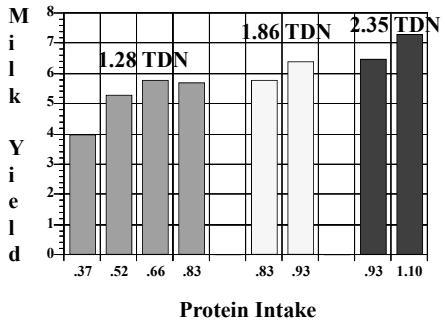
Lactation rations

125 lb ewe lamb

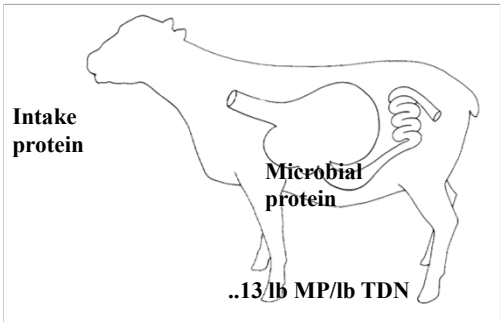
	Single	Twins
Lamb gain	**.6**	**.4**
Brome/alfalfa[a]	**3**	**4**
Barley	**1.5**	**1.5**
Soybean meal	**.5**	**.5**

[a] Hay quality good, 13.9% CP and 56% TDN
Trace mineral and Vitamin E

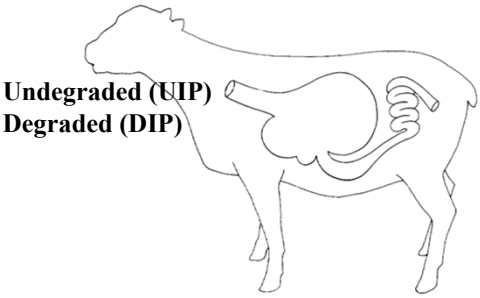
Energy and Protein vs. Yield



Protein Sources



Intake Protein



Value of Protein Sources for UIP

	% CP	% UIP	UIP Conc. %
Grass Pasture	6-20	10	2
Alfalfa Hay	16-24	15	2.7
Barley	13.5	20	2.7
SBM 44, Solvent	44	25	11
SBM 44, Expeller	43	50	21.5
CGM	60	40	24
DDGS	28	55	15.4
Blood Meal	85	80	68
Fish Meal	60	40-80	24-48

Milk Yield Results from Additional Protein

	Protein Added	
Protein Source	**.18 lbs.**	**.44 lbs.**
Urea	**.29**	**0**
Nutmeal	**.88**	**0**
Soybean Meal	**.88**	**0**
Meat & Bone Meal	**.88**	**0**
Lineseed Meal	**1.32**	**0**
Fish Meal	**1.32**	**.55**
Blood Meal	**1.32**	**.74**

145 lb. ewes rearing twins fed
base diet 2.67 TDN 11.6% CP
Gonzalez et al. 1982

Vitamin E

100 IU/day/head extra above feed E
14 d pre-lambing through 35 d lactation

Mineral source of E is inadequate
20 pounds of mineral mixed with
4 pounds of E (20K IU/lb)
assumes ½ ounce intake per day

Iodine

Lactation Ration = .8 ppm or mg/kg

Most mineral mixtures are short
needs to be 140 ppm in mineral with .5 ounce intake
intake levels
Solutions free choice iodized salt

Spike mineral source with iodine (EDDI)

Summary

- All phases of production are important
- Correctly feeding the flock requires more than one pen
- Adequate MG nutrition for placental development
- LG prepares for lactation and adequate birth weights for high survival
- Lactation takes both protein and energy, wt. loss hurts production

Critical Nutrition Inputs for Ewe Nutrition

Dr. Dan Morrical
Iowa State University

Introduction:

Sheep nutrition and feeding is extremely critical to the success or failure of the ewe flock enterprise. As shepherds our task is to provide balanced rations to meet the ewe's nutrient requirements on the least costly basis. Feed costs account for half the cost of producing lamb and wool. Therefore, cost control must always be foremost in the shepherd's mind. Sheep enterprises face a greater challenge in meeting needs of the flock because of the large within flock and between flock variations. This paper reflects the general guidelines for feeding ewes; however, each operation must adapt and modify these guidelines for their specific operation.

Nutrient Requirements:
The amount of nutrients the sheep require is affected by several factors. These include ewe age and weight along with stage of production and level of production. Figure 1 outlines the stages of production, demonstrates how nutrient requirements change through the production cycle. It is important to realize that all ewes in the flock are not at the same stage of production on any given day. This factor is affected by the length of the breeding season and production system (once a year lambing versus accelerated lambing systems).

Critical phases of the production cycle include flushing/breeding as it sets the maximum drop rate for flock. Early/mid gestation is critical in that placental development occurs from day 30-90 of gestation. Placental size or weight effects nutrient transfer between the ewe and fetuses. Underdeveloped placenta results in smaller birth weights regardless of late gestation nutrition. Twenty days of severe underfeeding or 80 days of slight underfeeding will both retard placental growth. The remainder of this paper will deal with late gestation and lactation stages of production since most flocks are grazing during other production phases.

Late Gestation Nutrition:
Determining how much to feed ewes in late gestation is a very difficult practice without fetal scanning. The goal of late gestation nutrition program is to insure adequate nutrient intake for strong vigorous lambs of moderate birth weight. Additionally, ewes must enter lambing season in average to above average body condition to maximize milk production. Adequate birth weight of lambs is critical to a successful lambing season since small lambs have less resistance to cold stress and reduced pre-weaning growth. Excessively big lambs increase the incidence of lambing problems and increases shepherd labor and lamb death loss. Fetal scanning and the separation of ewes into different feeding groups for those carrying singles, versus twins versus triplets or more helps to reduce the real big singles or small twins and triplets. Experienced technicians have accuracy values above 90% on fetal numbers so contracting an experienced scanner is the key to successful implementation of this technology.

The nutrients of greatest concern during late gestation feeding would be energy (TDN), crude protein (CP), calcium, selenium, iodine and vitamin E. The TDN level required is affected by the number of fetuses and cold stress. Winter lambing ewes generally cannot consume enough forage alone to meet their energy requirements, thus requiring the feeding of concentrates (corn).

Fetal growth accelerates rapidly during late gestation. Furthermore, energy required is much higher for the two weeks prelambing versus six weeks prelambing. A means of controlling costs is to step up grain feeding as lambing approaches. Ewes carrying singles require less grain and do not need to receive grain as early as those carrying multiples. Late gestation rations should begin 5-6 weeks prelambing for ewes

carrying triplets. Those with twins can be delayed to 3-4 weeks prelambing whereas those with singles can be held off until two weeks prelambing.

The absolute level of grain to feed is highly dependent upon the nutrient density of the forage being fed. Table 2 demonstrates the huge variation in nutrient density of hays. Nutrient analysis costs $15-$25 per sample and is money well spent. Balancing diets based on average or book values for hay is a risk progressive shepherds should not take especially in highly productive flocks. Furthermore, one can not accurately determine the nutrient density of hays with visual appraisal. Table 1 provides example rations for all phases of production with a wide array of forage sources. To minimize the risk of acidosis from excess grain feeding, ewes receiving over 1.5 pounds of concentrate per day should receive it in split feedings.

Selenium and vitamin E are both critical micro-nutrients for lamb survival and a smooth lambing season. Selenium can be added to the ration of sheep at .3 PPM or .3 mg/kg of feed. The maximum allowable selenium intake from supplemental sources can not exceed .69 mg per head per day. This is a very small amount and extreme care is required in calculating how much to add. More importantly selenium at 2 PPM can be toxic. Selenium status of ewes is dependent upon both the selenium concentration and intake of the mineral, along with the selenium level in the feedstuffs. Flocks with a history of selenium problems in newborn lambs should consider force-feeding selenium via the grain mix. This insures all ewes consume adequate amounts on a more uniform basis. If selenium is force fed, there should not be a free choice selenium source available. Table 3 shows the level of intake required for various selenium concentrations in the mineral or trace mineral salt. Selenium crosses the placenta so newborn lambs selenium status is totally dependent upon the selenium status of their dams in late gestation ration.

Vitamin E, unlike selenium is not toxic. Vitamin E does not cross the placenta so a newborn lamb's only source of E is ewe's milk or injections. The concentration of Vitamin E in ewe's milk or colostrum is directly correlated with the Vitamin E intake of the ewe. Vitamin E levels are extremely variable in feedstuffs because the E denatures with storage and is also denatured in the rumen as grain feeding increases. As a rule of thumb I suggest feeding 100 international units (IU) per ewe per day for each lamb she is carrying or nursing.

We all know iodine is connected with basal metabolic rate. The primary symptom of iodine deficiency is goiter. SDSU and ISU diagnostic labs both report selenium and iodine are the two most common micro mineral deficiencies. The 2007 NRC for Small Ruminants drastically increased the iodine requirements in late gestation for ewes. Iodine requirements are further increased in cold environments. Most commercial mineral supplements for sheep contain inadequate iodine concentrations to meet these higher requirements. A practical solution is to provide iodized salt blocks in combination with the mineral source. If stillbirths and hypothermia is one of your most common cause of lamb losses than iodine deficiency may be an issue in your flock.

Lactation Nutrition:

Lactation is the phase of production with the highest nutrient demand as shown in Figure 1. The amount of nutrients required is dependent upon the number of lambs nursed. Because of the huge differences in requirements, the most important time to split the flock into production groups is during lactation. Ewes peak in milk production around 21 days of lactation and should sustain high milk production levels through 6-8 weeks of lactation.

Nutrient requirements in table 1 are based off of projected milk yield when individual lambs are gaining .75, .65 and .5, respectively for singles, twins, and triplets respectively from birth to weaning. Calculations are based upon a standard of four pounds of ewe milk being required per pound of nursing lamb gain when creep feed is available. Using this standard, one can assume a ewe nursing twins gaining a pound per day

each and with creep feed access would be producing eight pounds of milk per day. This is a very high level of milk production which cannot be sustained without high feeding levels.

Protein and energy are both critical nutrients for milk production. If either nutrient is fed below the requirement, milk yields and subsequently lamb gains will be reduced 10% or more depending upon the magnitude of the short fall. I would suggest that almost all ewes lose weight during lactation, many over 35 pounds. This occurs because energy intake is well below requirements and ewes must mobilize body stores to sustain milk production. Weight loss during lactation is the critical reason that late gestation nutrition must be adequate to insure ewes are in average or better body condition at lambing. Traditionally, fat mobilization during lactation was considered as a means of controlling feed costs. However, excess weight loss is not without its costs. Ewes losing less than .5 condition score during a 60-day lactation will not suffer in terms of milk yield. Since one condition score equates to an 11% change in body weight, a 200 pound ewe could only lose 11 pounds (200 x 5.5%). This value would equate too less than .2 pounds of weight loss per day. It would not be uncommon for many ewes to lose two to three times this amount.

Weight loss during lactation impacts protein requirements. The more weight ewes lose the higher their protein need. This situation is due to the ewe's ability to effectively mobilize body fat but having minimal ability to mobilize body protein for milk synthesis. It is also important to realize that fat conversion to milk is about 60% under protein and energy deficient rations whereas with adequate protein fed, body fat conversion to milk is 80%. To demonstrate this relationship between protein requirements and weight loss, a ewe losing .5 pounds per day requires a lactation ration containing 21% crude protein. However, if the energy intake is increased to prevent weight loss, this ewe would require only 11.5% crude protein in their ration. Generally, energy is cheaper per unit to feed than protein.

Lactation nutrition mistakes:

One of the most common mistakes inexperienced shepherds make is over feeding grain to the ewes in the lambing jug. This situation most frequently occurs when we try to accelerate the milk output in ewes that do not have enough to feed their lambs. This over feeding can create problems with acidosis and lead to less milk production rather than more. Newborn lambs probably do not consume more than 10% of their bodyweight in the first day or two of life, so it is not critical that ewes be pushed while in the jug.

The next mistake that needs to be avoided is over feeding the ewes in the week to ten days before weaning. Many flocks routinely wean ewes while in the peak stage of milk production. It is critical that shepherds modify the pre-weaning diet of ewes to reduce mastitis problems. This is easily accomplished by cutting off the grain feeding for the last 10 days before weaning along with feeding low quality hay. This management input is trying to limit the ewe's protein and energy intake as both nutrients are required for milk production. Feeding straw for the last 2-3 days before weaning further shuts down milk production. After weaning ewes should be maintained on low quality feed for 3-7 days to assist ewes in drying up. Lastly, if ewes are fed by number nursed, it is important to move ewes to the next lower ration if they lose a lamb or lambs.

The nutrition program that ewes require is dynamic and ever changing throughout the production cycle. We as shepherds must make the appropriate adjustments to account for those changes. Ewes have no nutritional wisdom, so it is our jobs as shepherds to do the ration balancing and feeding the appropriate amounts. Iowa State University has a very good excel spreadsheet for balancing rations available at the following webpage. https://store.extension.iastate.edu/Product/BRaNDS-Sheep-Companion-Module-Standard-Edition or https://store.extension.iastate.edu/Product/BRaNDS-Sheep-Companion-Module-Professional-Edition

Table1. Example rations for 175 ewes in various stages of production.

Feed Ingredient	Early/Mid Gestation				Late Gestation: Singles				Late Gestation: Twins				Late Gestation: Triplets				Lactation: Singles				Lactation: Twins				Lactation: Triplets			
Alfalfa hay (EB)	3.3				3.5		2.0		3.5	2.0			3.5	2.0			3.7		2.0		5.0	3.0			4.0			
Corn silage				6.0				9.0				9.0				8.0				10.0			13.0			13.0	
Cornstalks			3.0				2.0				3.0			2.0					2.0			2.0						
Grass hay		2.5				3.0				1.5					3.75			3.0										
Corn					1.0	.75			1.5	.75	1.5	.7	1.8	1.3		.9	.7				1.5				2.0			
SBM		.3		.4		.75		.8			1.0	.7		.5		.9		1.4		.5			1.0		.5	1.5	
Corn gluten feed			1.0				1.2				1.0								1.0			2.0						
Limestone			.02	.01		.02		.02			.03	.03				.03		.02		.02			.02			.02	
Dical. Phosphate																	.02	.01		.01			.02			.02	

Example rations for 200 ewes in various stages of production.

Feed Ingredient	Early/Mid Gestation				Late Gestation: Singles				Late Gestation: Twins				Late Gestation: Triplets				Lactation: Singles				Lactation: Twins				Lactation: Triplets			
Alfalfa hay (EB)	3.5				4.0				4.0				3.75				5.0		3.0		6.0				6.0			
Corn silage				7.0				12.0				12.0				10.0				12.0			16.0			14.0	
Cornstalks		4.0				4.0				4.0				3.0					2.0									
Grass hay			3.0				4.0				4.0				3.75			5.0				5.0						
Corn					1.0	1.2			1.5	1.5			1.8	2.0		1.0	.7				1.5	1.0			2.0		.5	
SBM		.40		.3		.6		.6		.7		.8	.2	1.0		1.0		1.0	1.0		.2	1.5	1.5		.5	2.0		
Corn gluten feed			.7				1.6				2.0				2.5													
Limestone		.01		.01		.02	.02	.02		.03	.03	.03		.04	.04	.04		.02	.02	.02		.02	.02			.02		
Dical. Phosphate							.01											.02	.02	.02		.02	.02			.02		

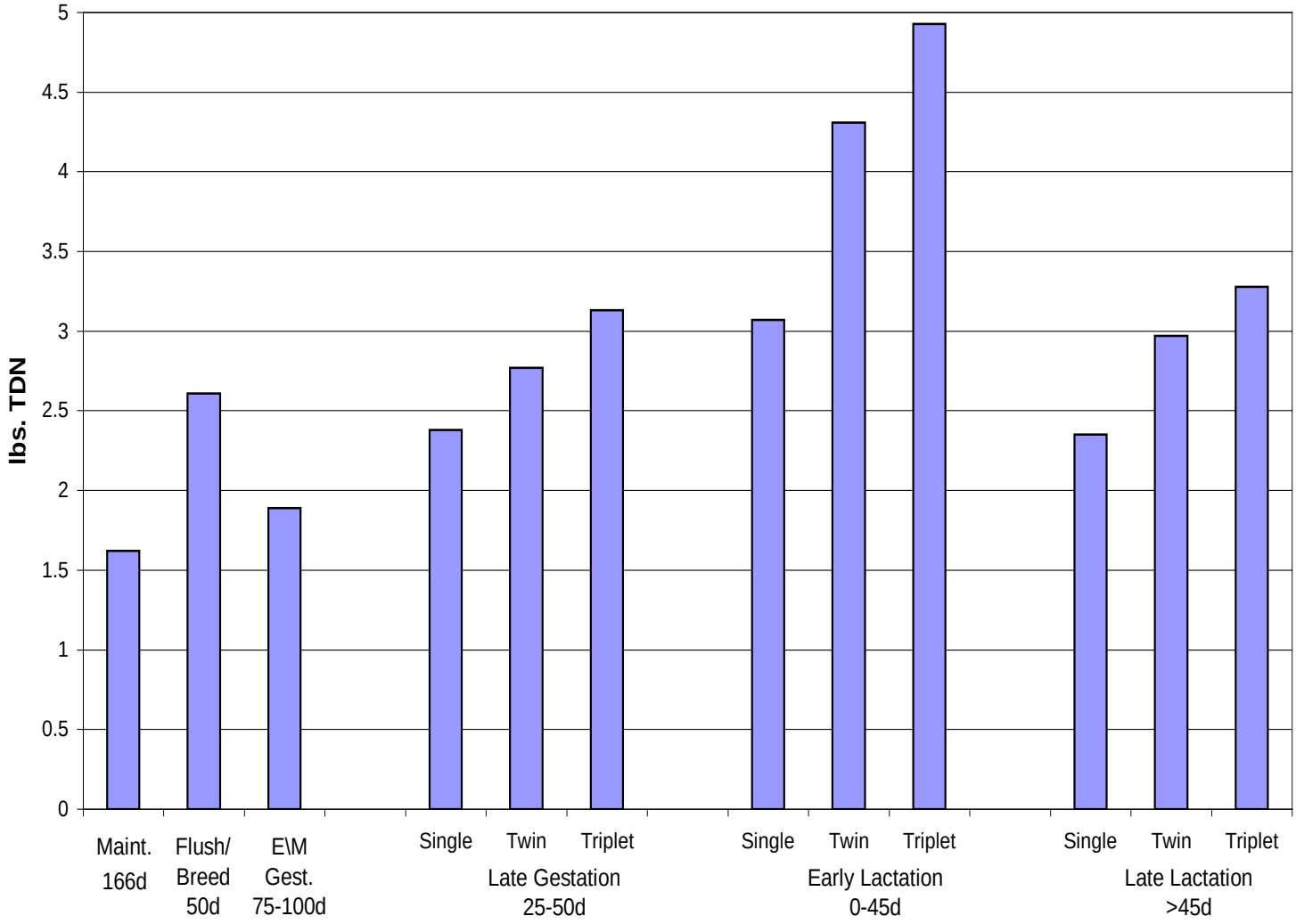


Figure 1. Total digestible nutrient (TDN) reqiuired by 175 pound ewes through their annual production cycle.

Table 2. Variation in forage quality from 1994 state wide Iowa forage survey.

	Crude Protein,%			TDN,%		
Hay type	Average	Low	High	Average	Low	High
Grass, 1st cut	11.6	6.1	20.7	55.7	46.6	75.2
Grass, 2nd cut	15.2	12.1	19.7	61.8	57.2	69.7
Alf/grass, 1st cut	13.9	8.0	22.3	56.1	41.0	75.1
Alf/grass, 2st cut	16.8	10.2	22.3	59.6	47.3	69.7
Alf/grass, 3st cut	18.3	10.9	22.3	62.4	49.1	72.5

Nutrient values are based on NIRS technique.

Table 3. Trace mineral salt or mineral intake required for .69 mg selenium intake[a].

Selenium concentration in Mineral	Intake, oz/head/day
10 PPM or .001	2.4
30 PPM or .003%	.8
50 PPM or .005%	.5
70 PPM or .007%	.33
90 PPM or .009%	.25

[a] Maximum allowable by FDA