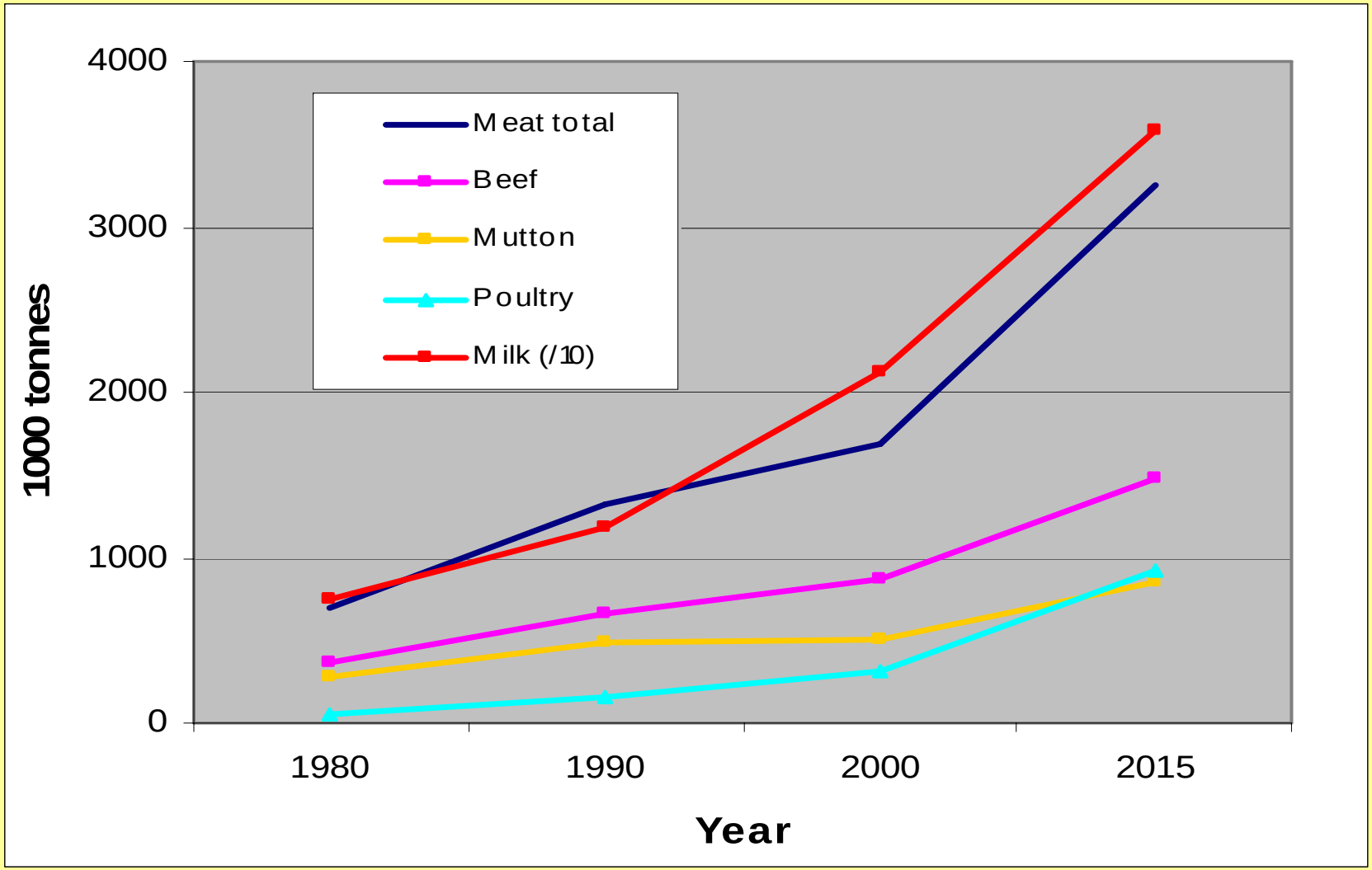
Dairy Knowledge Fair

Nutrition of Dairy Animals

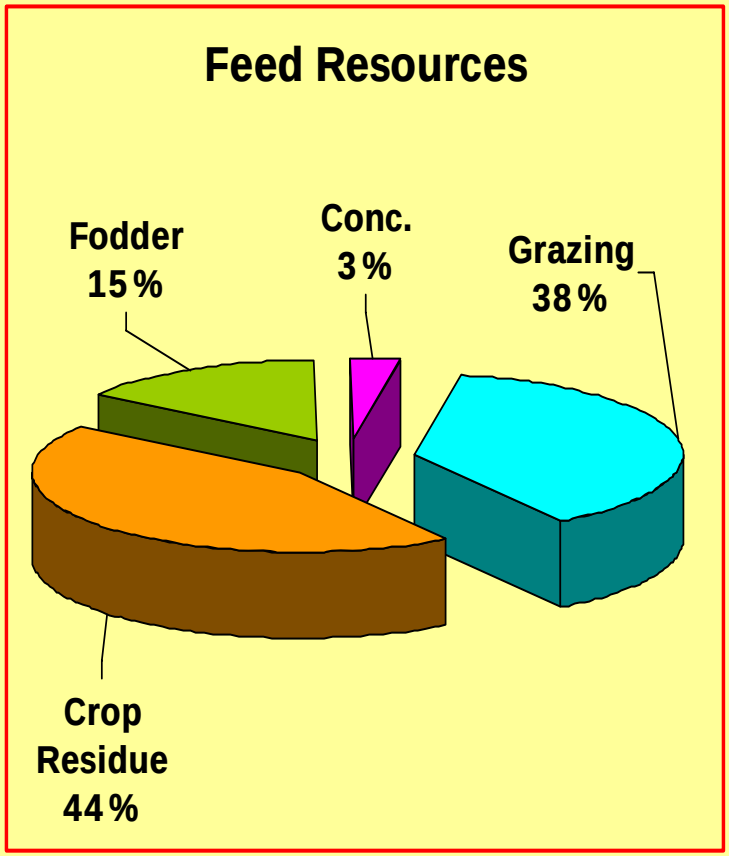
Prof. Dr. Talat Naseer Pasha
Department of Animal Nutrition
University of Veterinary & Animal Sciences, Lahore

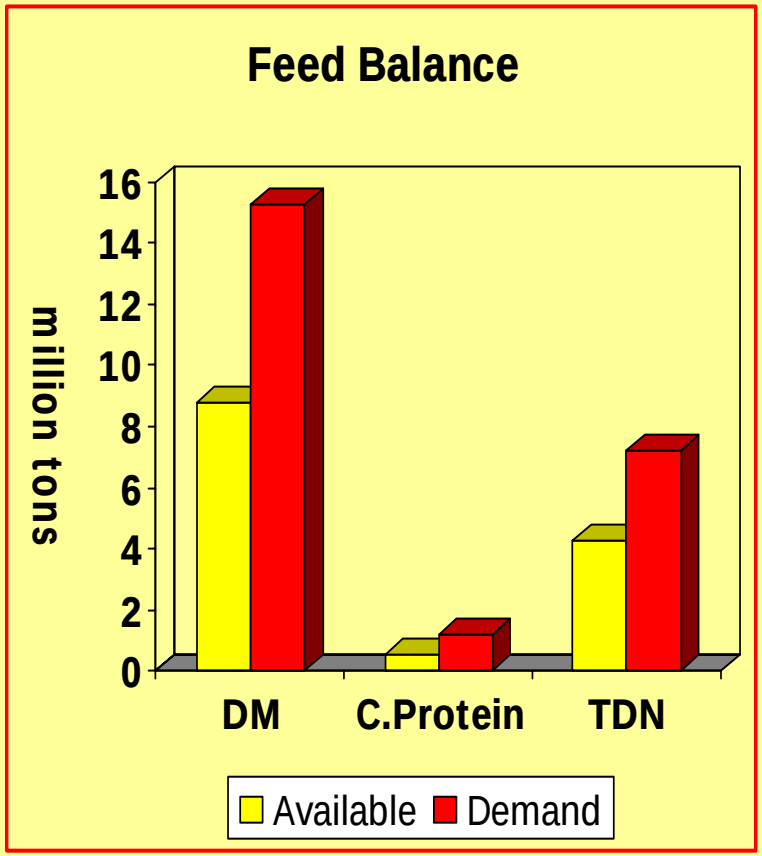
Livestock Products Consumption Growth in Pakistan *(FAO, 2002)*



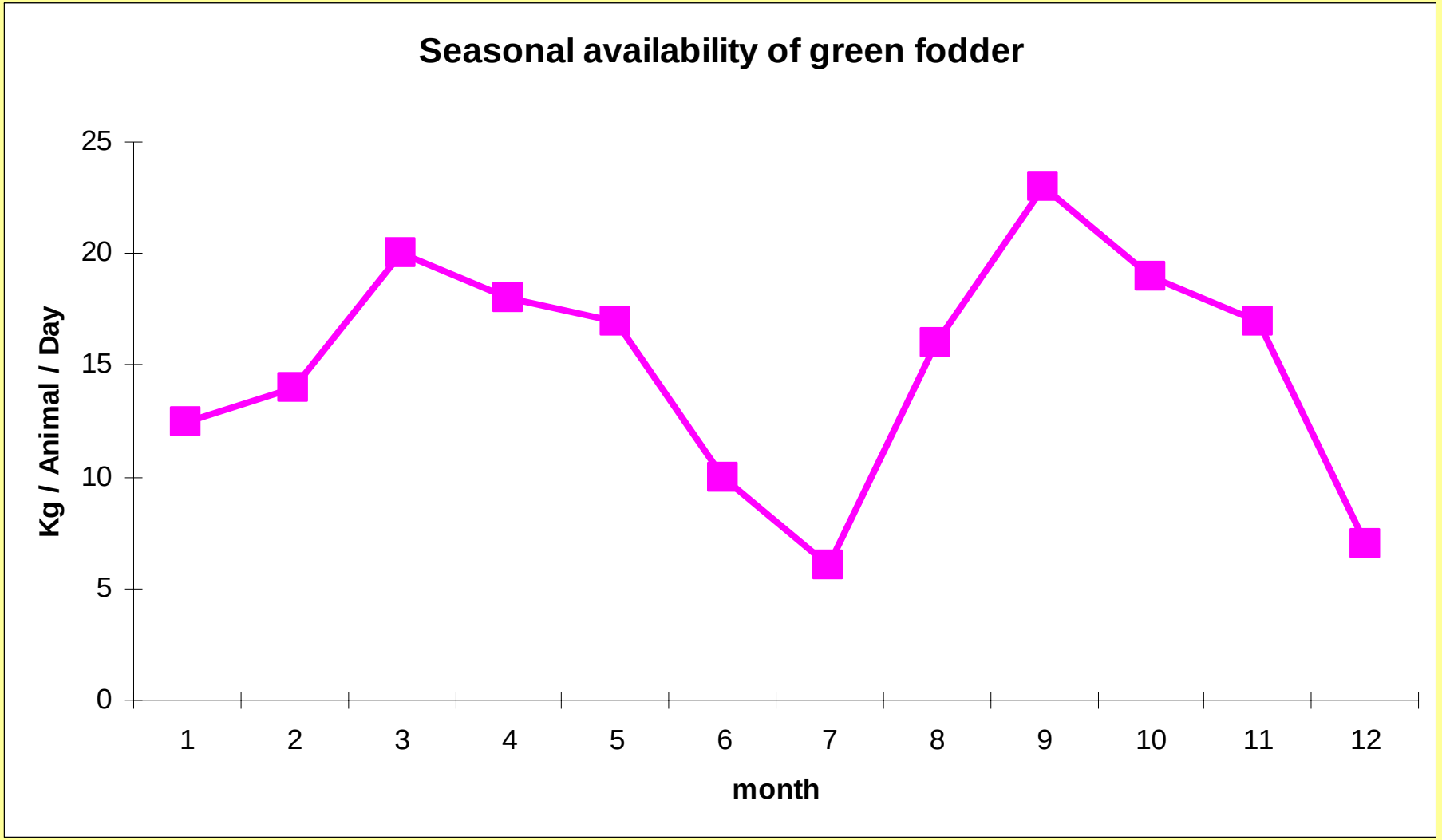
Livestock revolution driven by rapid rise in consumption of animal products

Feed Availability & Demand in Pakistan; Current Situation

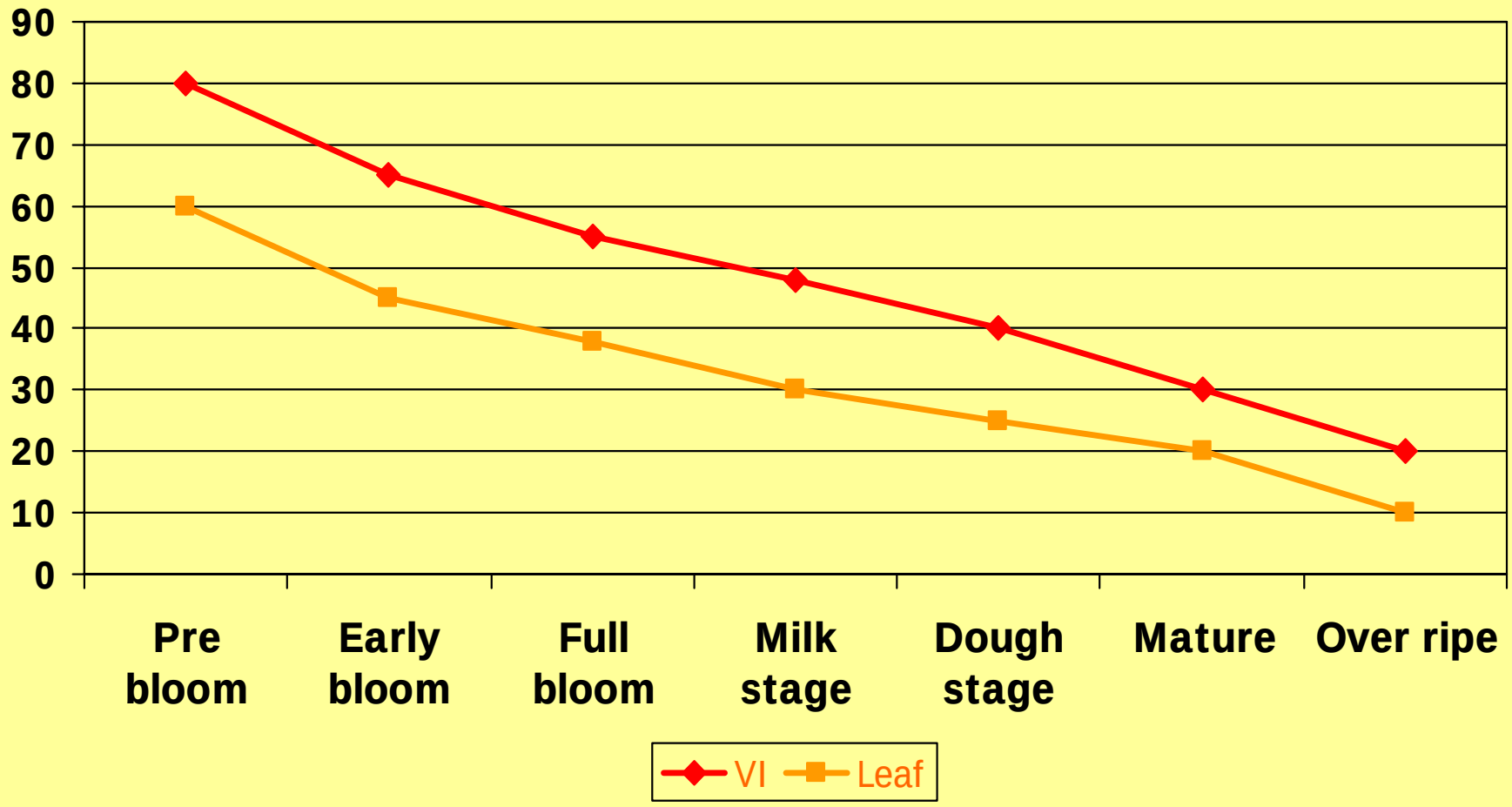




Availability of Fodder During the Year



Nutritional Value of Fodders

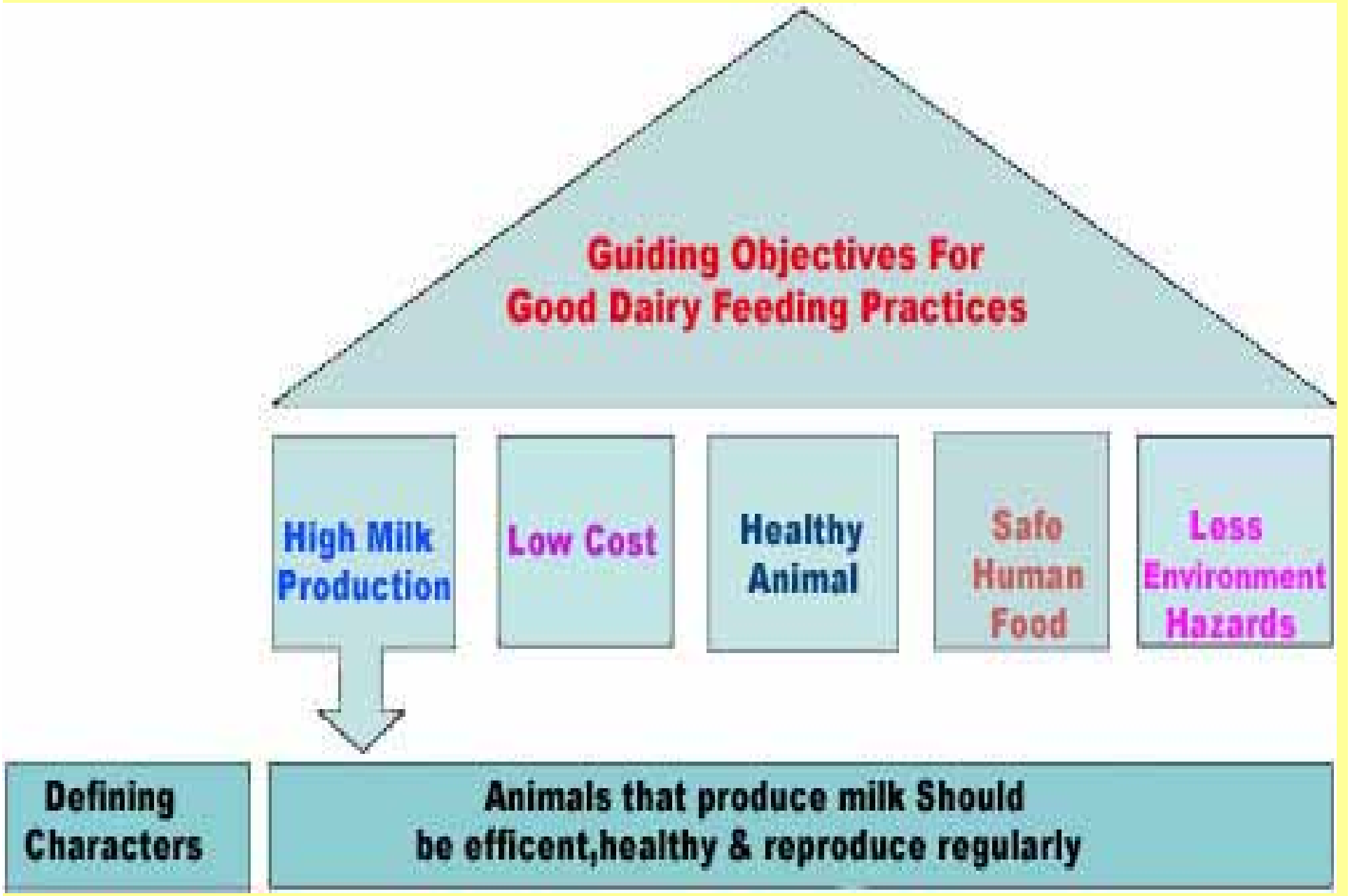


Summer Fodders

Fodder	Yield / Acer Tons	Dry Matter %	Protein %
Maize	18~20	20.10	7.11
Sorghum	20~25	30.00	6.20
Sada Bahar	50~60	27.59	5.98
Millet	20~22	29.50	6.08
Guara	15~18	20.90	17.35
Mott Grass	70~90	16.54	7.52

Winter Fodder

Fodder	Yield / Acer Tons	Dry Matter %	Protein %
Barseem	30~35	15.62	19.90
Lucern	50~60	24.26	22.83
Oats	25~35	22.10	8.98
Rye Grass	30~40	14.21	22.85
Barseem+Oats	30~35	18.86	14.44
Bareem+ Rye Grass	35~40	14.91	21.75


Guiding Objectives For
Good Dairy Feeding Practices
High Milk Production
Low Cost
Healthy Animal
Safe Human Food
Loss Environment Hazards
Defining Characters
Animals that produce milk Should be efficent,healthy & reproduce regularly

Feeding Management

An Art that need to know;

- **Requirements of the animal according to milk yield & lactation stages**
- **Nutrient composition of available feeds**

&

How to combine different feeds to match the animal requirements

Should be

- **Balanced approach**
- **Cost effective**
- **Sustainable**

Feeding Management

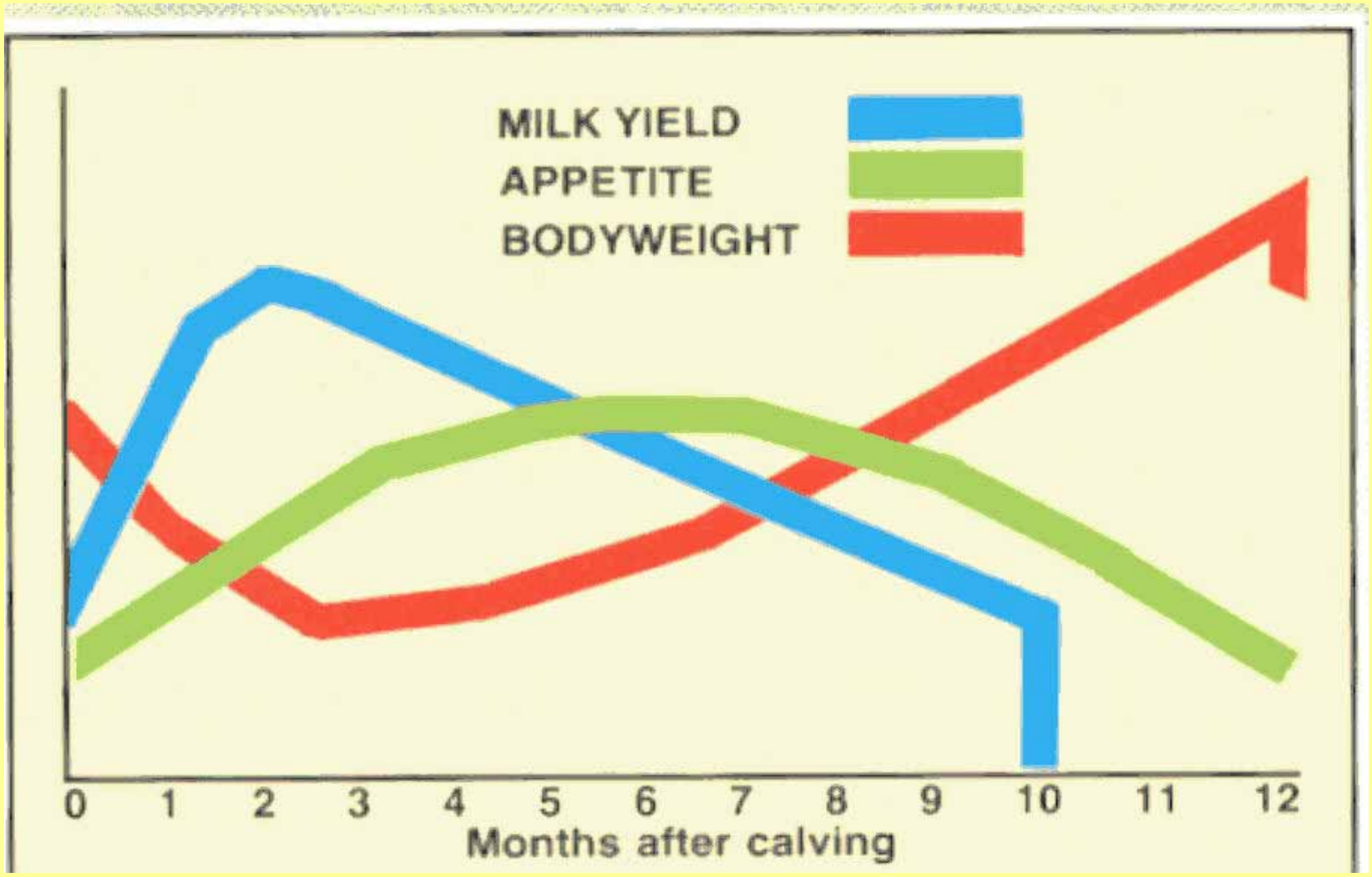
Start from Pregnancy

to

End of Lactation Period

(Peak, mid, late lactation)

Feeding Management



Feeding in Pregnancy (Last 2 months)

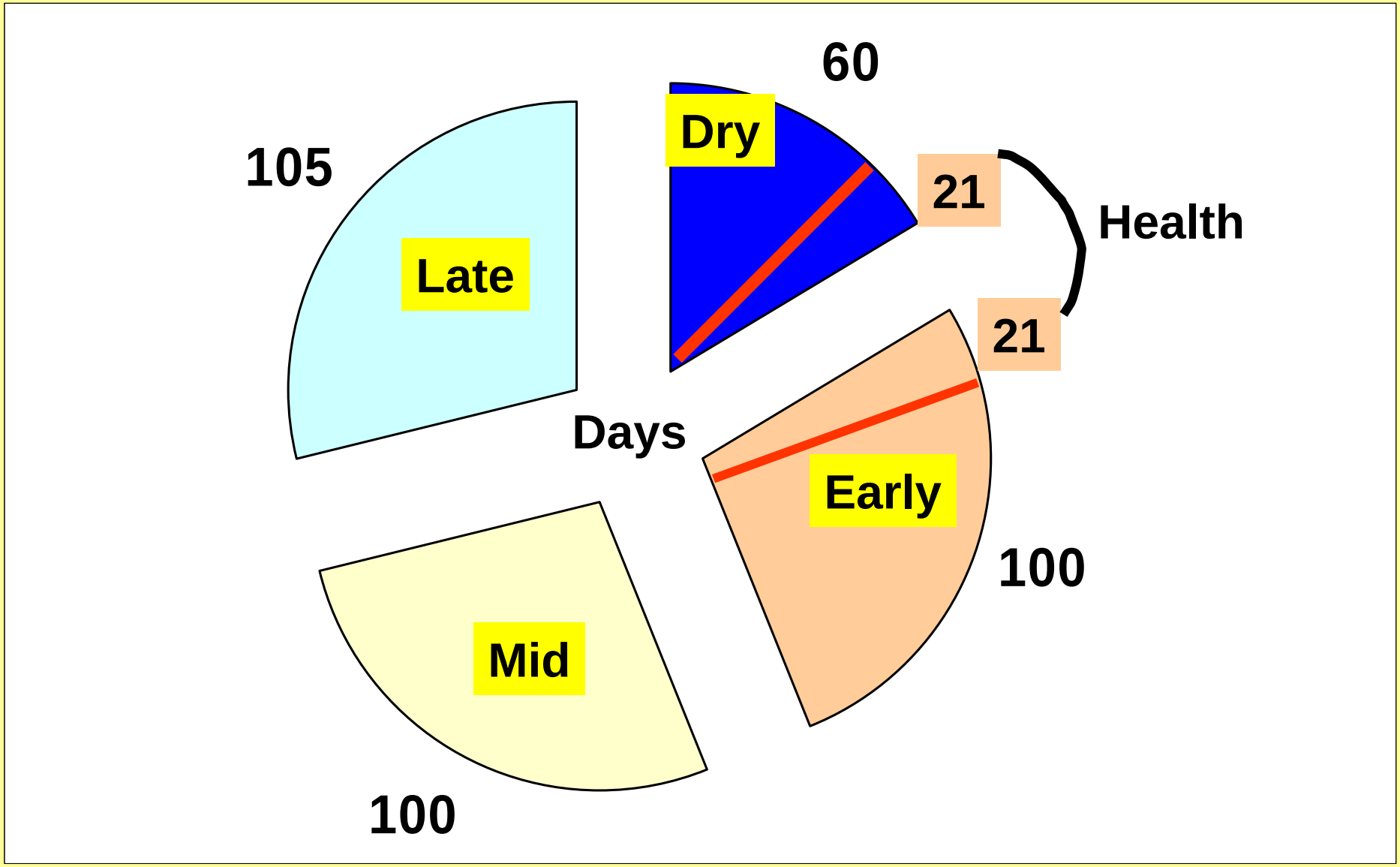
For;

1. **Rapid growing foetus**
2. **Develop body reserves for use in subsequent lactation**

How;

- **Give rest if in milk (forced drying)**
- **Feed concentrate 2 kg/day + good quality fodder, restrict straw**

Feeding Dairy Cow



Feeding Management

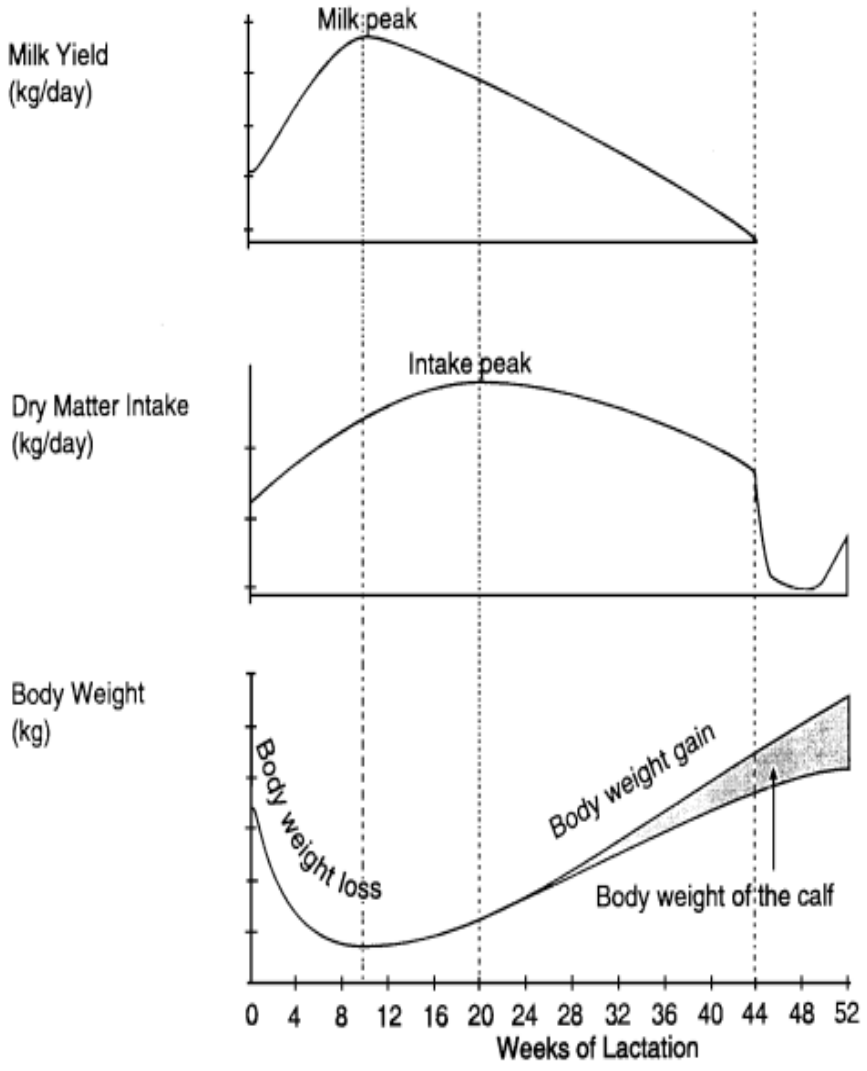
- **21 days prior calving**
  - Start grain feeding
  - Increase CP to 15%
  - Limit added fat 100 gm/d
  - Yeast 10~50g/d
  - Add niacin 6gm/d
  - Good quality forage
  - Restrict Ca in last two weeks
- **21 days after calving**
  - Good quality forage
  - Maintain healthy level of fiber
  - Avoid high starch level
  - Undegradeable protein & digestible fiber
  - Yeast 20~50 gram/d
  - 12 gm niacin/d
  - 150 g oil in mixed feed

Early lactation (First 100 days)

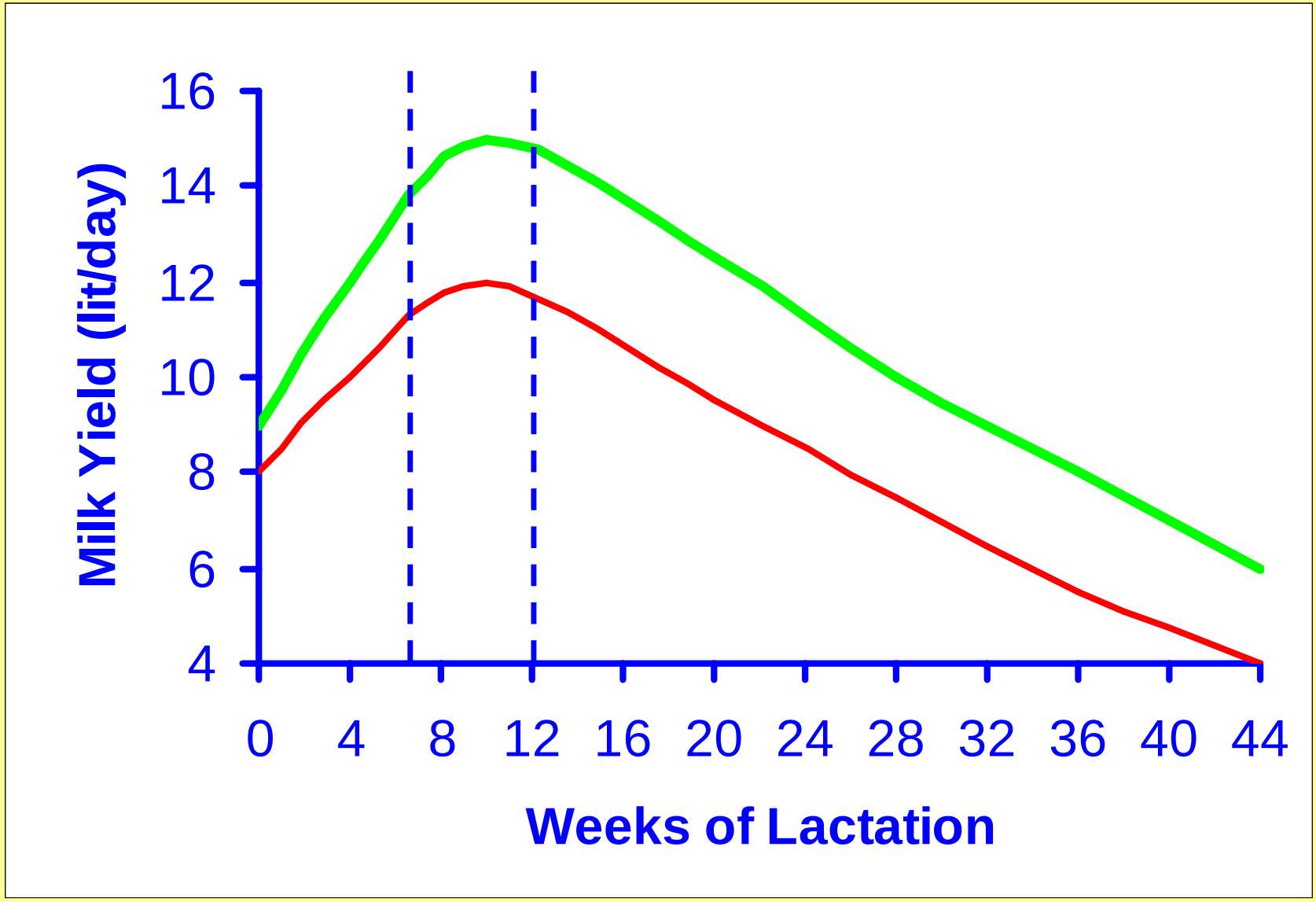
- **Most critical period**
- **Period of peak milk yield**
- **Higher the peak yield more will be the milk yield throughout lactation until drying off.**

Events During Different Phases of Lactation

- Nutrients demand for peak milk yield is high
- Can not eat to full capacity during early phase
- Uses body reserves as energy source
- Rapidly looses body weight



Increasing Peak Milk Yield Improve Lactation Performance



Concentrate Composition & Allowance (Traditional Practice)

- **Imbalanced home made concentrate mixtures particularly in Protein/Energy & Calcium/Phosphorus**

- **Faulty feeding management of concentrate allowance; given irrespective of milk yield**

Composition of Conventional Concentrate Mixtures

Ingredients	1	2	3	4	5	6
Cottonseed Cake %	50	33	67	33	50	50
Wheat Bran %	50	67	33	33	25	25
Maize oil Cake %	0	0	0	0	0	25
Dried Bread %	0	0	0	33	25	0
Total	100	100	100	100	100	100
Crude Protein %	*21*	*20*	*22*	*18*	*20*	*20*
TDN %	*68*	*69*	*67*	*72*	*70*	*70*
Calcium (g/kg)	*1.6*	*1.5*	*1.5*	*1.8*	*1.8*	*1.8*
Phosphorus (g/kg)	*12*	*13*	*12*	*11*	*11*	*11*

Flat Rate Concentrate Feeding

- Deprive high producers
- Overburden the low producers with soluble Protein (protein consumption > 1 kg/day)
- Protein toxicity
- Reduce fertility
- Early embryonic mortality (low pregnancy)
- Reduce immunity & more health problems
- Excess nitrogen excretion causes environment problems (air & drinking water) affect human health

Selection of Concentrate Feeds

- **Nutrient composition (Protein, energy, minerals)**
- **Protein**
  - **Contents (Quantity)**
  - **Digestibility**
  - **Amino acids profile**
  - **Matching with the forages fed**
- **Cost**
  - **Price per Kg**
  - **Price per Kg protein contents**

Cost of Concentrate Feedstuff on Protein Basis

Feed	Protein %	Cost Rs/Kg	Cost Rs/Kg Protein
Cottonseed cake	19	10	53
Wheat bran	12	7	58
Maize oil Cake	16	12	75
Sunflower cake	28	12	43
Cottonseed meal	41	15	37
Soybean meal	46	17	36

Chemical Composition of Energy Sources

Ingredient	DM, %	Protein, %	TDN, %	ME MCal/kg
Maize	89.61	9.80	81.2	2.94
Sorghum	90.20	15.75	78.5	2.84
Wheat	92.70	12.80	78.9	2.85
Oats	91.94	9.52	75.1	2.71
Barley	91.40	10.21	77.2	2.79
Mamni	90.10	17.00	60.10	2.60
Rice polishing	92.60	11.66	89.90	3.25
Wheat bran	91.40	14.99	71.00	2.57
Rice bran	89.10	14.0	68.12	1.89
Molasses	82.30	3.04	80.50	2.91

Ingredient Comparison

	Cotton Seed Meal	Soybean Meal
Protein, %	41.20	46.45
ME, Kcal/kg	2570	3320
TDN, %	68	78
Lysine, %	1.60	3.09
Lysine digest., %	59	85
Methonine, %	0.57	0.66
Mycotoxin	++++	-
Pesticide Residue	++++	-
Gossypol	+++	-

Conventional Feedstuff

OPTIMUM LEVELS OF VARIOUS FEED INGREDIENTS IN THE RATION.

Name of Ingredients	Safe Upper level in the Ration	Reasons
Cotton seed cake	20-25	Quality, toxins, pesticides
Rape seed cake	10-13	Bitter taste, glucosinolates
Sunflower cake	10-13	Less palatable, off flavor in milk
Cotton seed meal	15-20	Price, quality, toxins
Rape seed meal	15	Bitter taste, glucosinolates
Canola meal	15-20	Off flavor in milk
Pea nut cake	20-25	Anti-nutritional factors, toxins
Maize gluten 20 & 30%	20-25	Quality/toxins & taste
Maize gluten 60%	5-10	Price, toxins/protein %
Soybean meal	10-15	Price
Urea	1-2 %	Toxicity, low productivity

OPTIMUM LEVELS OF VARIOUS FEED INGREDIENTS IN THE RATION Cont.

Rice polishing	20 %	Rancidity, off flavour
Wheat bran	25 %	Laxative
Molasses	15-20	Diarrhea
Wheat grains	15-20	Acidosis/price
Maize grains	40-50%	Low in calcium
Sorghum	15-20%	Tannins/price
Oils	2-3%	Costly, indigestion
Salt	1-2%	Requirements
DCP	1-2%	-do-
Mineral mixture	2%	-do-

Composition of Dairy Ration

Ingredients	Percent
Maize	18
Cotton seed cake	10
Rape seed cake	12
Wheat bran	10
Rice polishing	20
Rice bran	6
Sunflower cake	10
Molasses	10
Salt	1
Mineral Mixture	1
CaCo3	1
Urea	1
Crude Protein, %	18.0
TDN, %	76.0

RATION FORMULA FOR DAIRY ANIMALS

(With Soybean meal)

Feed Ingredients		Percentage
Soybean meal	=	14
Sunflower meal	=	15
Wheat bran	=	24
Rice polishing	=	20
Grains	=	10
Molasses	=	15
Mineral mixture	=	2.0
Total	=	100.00

Protein	=	18.21%
TDN	=	77.81%

How to over come the dry period feed scarcity problem

- Conserve green fodder as silage (maize fodder, sugar cane tops, oats, mott grass etc)
- Hay making (Berseem/lucern)
- Adopt urea treatment of straw for improved feed value
- Offer multinutrient feed blocks when poor quality forages are fed.

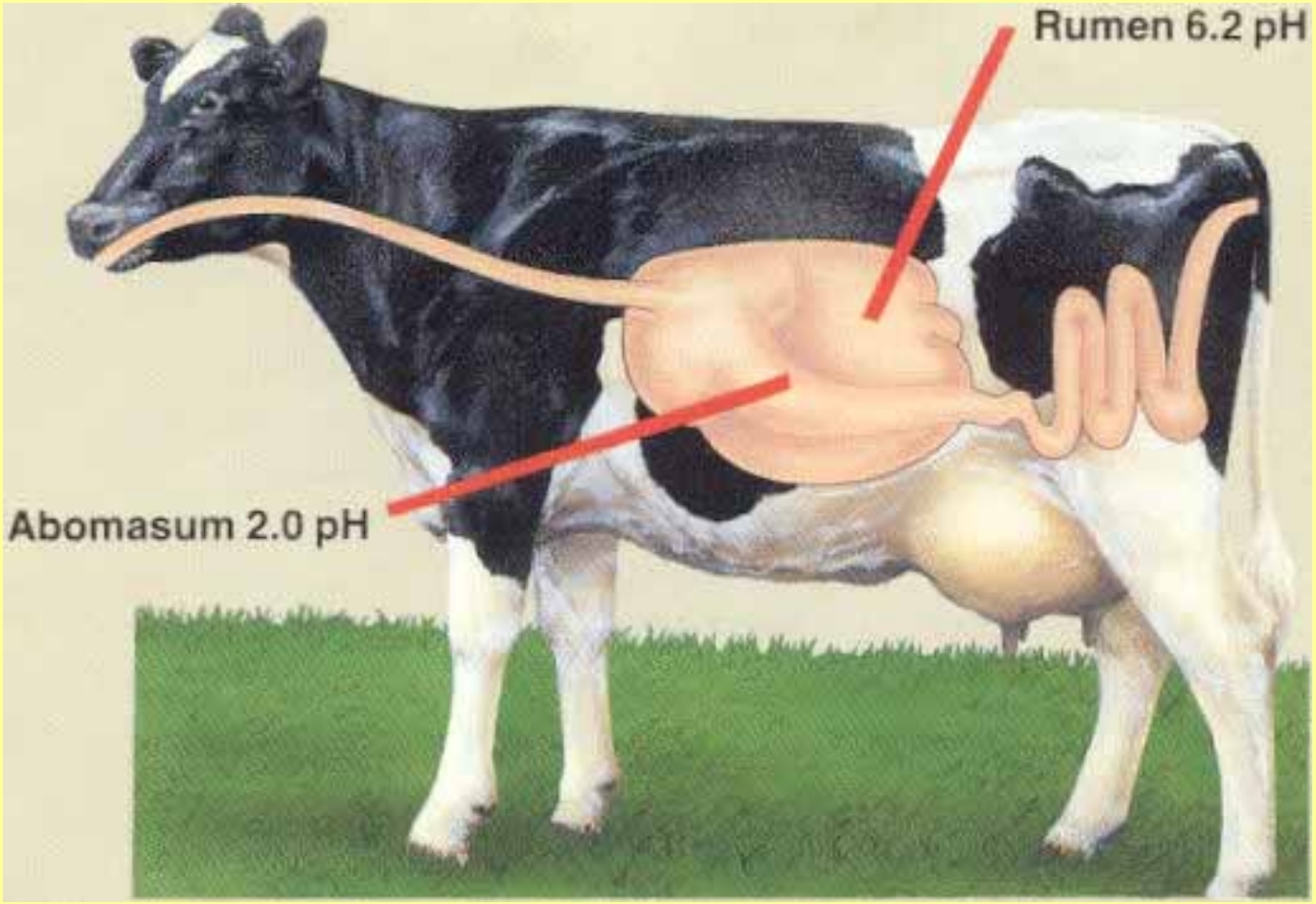
Silage Making

Hay Making

Molasses-urea Blocks are suitable with poor quality forages during dry period

“Feed additives to boost milk production”

Feeding Management



Buffers

Why Feeding Buffers

- **Increased intake**
- **Increased milk yield**
- **Increased milk fat %**

Why feed buffers?

High grain diets (>10 kg/d)

Low ruminal pH

Low fiber digesting bacteria

What buffers to feed?

Sodium bicarbonate

Magnesium sulfate

3:1 ratio

50 g/day

Yeast Sludge

Benefits of feeding yeast?

Increased feed intake

Increased milk yield

Decrease aflatoxin M1 in milk

Mineral Mixture

Ingredients	Percent
DCP	63.25
Sodium Chloride	35.00
Copper sulphate	00.25
Ferrous sulphate	00.75
Magnese sulphate	0.10
Zinc sulphate	0.50
Cobalt sulphate	0.10
Potassium iodide	0.05
Total	100

Water

- Overlooked as an important nutrient

- Water intake problems may limit milk production & growth, adversely affects health.

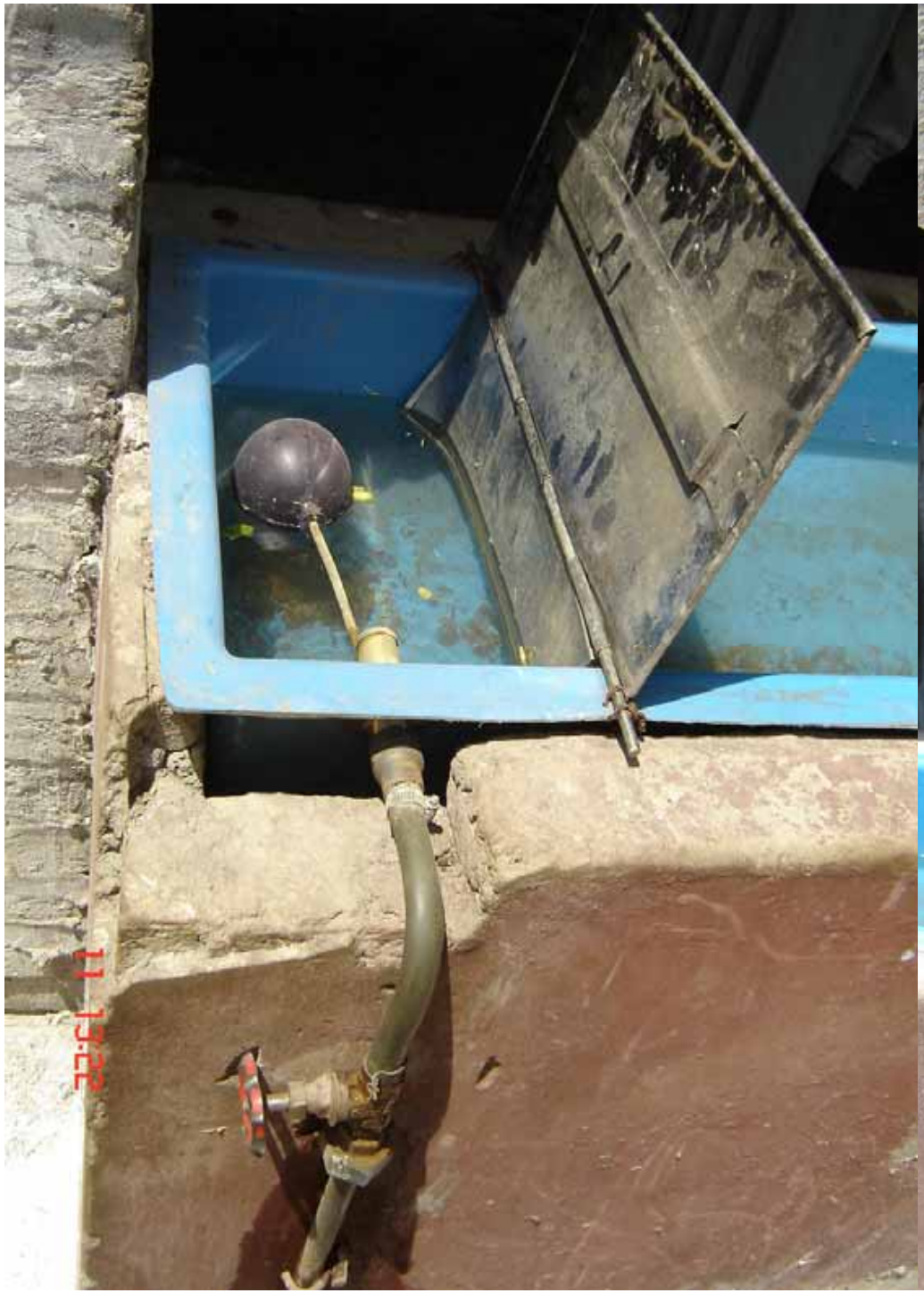
Water

- Animal needs plentiful good clean supply of water in access all the time.
  - Normal rumen function & metabolism.
  - Proper flow of feed trough digestive tract.
  - Good nutrient digestion & absorption.
  - Normal blood volume
  - Tissue needs

Water

- Requirement varies with type of feed, ambient temp. production level

- Water Quality (bacterial count, nitrates, pH)
- Water Temperature


11 13:22


11 13:21

Suggestions

- Select & mix different ingredients on basis of nutritional profile for making concentrate mixture (change from cakes to meals, e.g. SBM)
- Always add minerals especially take care of Calcium & Phosphorus ratio in the rations
- Plan your feeding program to raise the peak milk yield
- Never restrict feed & water soon after parturition

Suggestions

- Avoid large fluctuation in green fodder supply through hay and silage making
- Make best use of local feed resources with relevant supplementation & conservation
- Improve feeding value of straw through urea treatment for fodder scarcity period
- Use feed additives to boost milk production.
- Provide clean free choice water to dairy animals.


Thank You !