

# **Calf and Heifer Management**

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## **Raising Heifer**

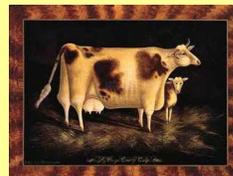
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- **Provide replacements for cows leaving the herd**
- **Improve genetics and production raised heifers economically**
- **Future investment**
  - **Minimize calf mortality**
  - **Try for rapid growth and development**
  - **Minimize costs and increase the efficiency**

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## Key Mgt Areas Affecting Calf Well Being & Performance

- Dry cow mgt.
- Maternity pen and calving mgt
- Nutrition
- Housing
- Sanitation
- Disease detection, mgt., and prevention
- Pain Mgt.



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## Dystocia

- **Any abnormal or difficult delivery process**
  - Poor communication between the fetal calf and it's dam
  - Mal-presentation of the calf
  - Difficulties due to inappropriate assistance
- **Scoring system for calving ease**
  - 5 point system
  - Score of 1 indicates **no assistance** was provided
    - Unobserved calvings are scored 1 by definition

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## Birth Weight Issue

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- **Use easy calving score bulls for breeding**
  - Specially in heifers
  - Maternal constraints on fetal growth are important, but they can be partially overridden by sire effects

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## Colostrum Management

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- **Colostrum contains:**
  - IgG, other immune factors, growth factors, 24% solids nutrients
- **Advantages of effective IgG transfer**
  - Reduction of mortality
  - Improves growth rate and feed efficiency (
  - Decrease age at first calving
  - Increase milk yield in 1<sup>st</sup> and 2<sup>nd</sup> lactation

Faber et al., 2005; Denise 1989; Nocek et al., 1984)

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## Colostrum Management

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### Colostrum Collection

- Bloody colostrum and colostrum collected from a cow with mastitis must be discharged
- Using colostrometer & after cooling down, check the quality (> 60 mg/ml IgG)
- Extra high quality colostrum should be stored in 2 qt. jugs and kept below 0°C
  - Indicate the IgG Concentration on the jug
  - @ 4°C for max. 2 days

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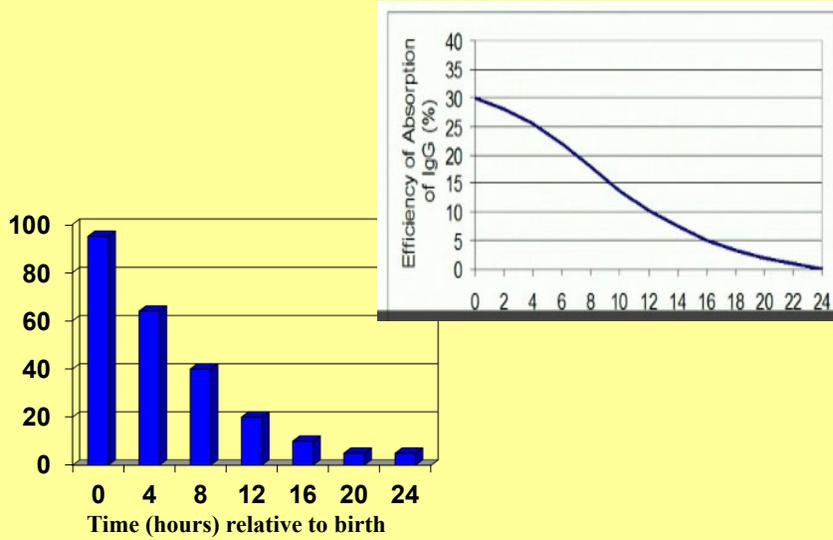
## Colostrum Management

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- Colostrum feeding
  - Two qt of top quality colostrum (70-100 mg/ml IgG) within < 4 hr after birth
  - A second 2 qt of colostrum before 12 hr after birth
- Colostrum Mgt.
  - Keep a good record of colostrum quality for each cow/heifer
  - Quality of colostrum fed to the calf should be recorded

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# Efficiency of Ig absorption

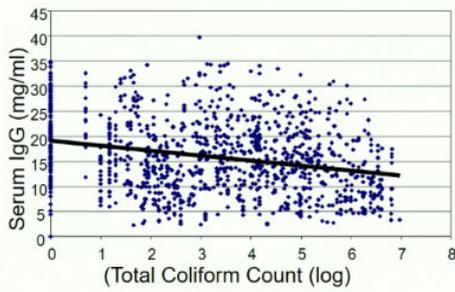
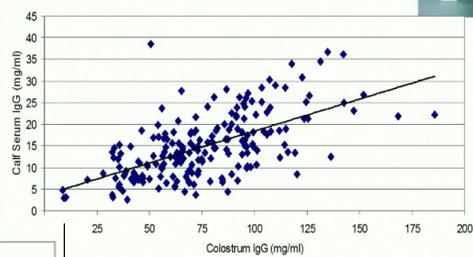


Courtesy of Dr. Kincaid and Goddon

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## 1. COLOSTRUM QUALITY

(Goal: IgG  $\geq$  50 g/L)



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## How is our industry doing at colostrum management?



	Goal	Current Reality
Quality	> 50 g/L IgG	US: ≈ 15.5% farms test w colostrometer or brix <sup>1</sup> QC: No farms tested quality <sup>3</sup>
Quantity	3-4 L (10% BWt)	US: 87% of farms gave ≥ 4 qts within 24 hrs <sup>1</sup> QC: Avg. 4.5 L within 24 hours <sup>3</sup>
Quickness	1-2 hr (6 max)	US: Avg. 3.6 hrs old at first feeding <sup>1</sup>
Cleanliness	< 100,000 TPC	US: 43% of samples failed <sup>4</sup>
FPT Rates	< 10%	US: 19% <sup>2</sup> PEI: 28% (5 herds) <sup>5</sup>

Adapted from Godden, 2016

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## The 5 Points of Colostrum Mgt

- *Quality, Quantity, Quickness, Cleanliness, quantity monitoring*
- **Factors affecting quality:**
  - Dry cow management (vaccination, nutrition, stress, length of dry period, milking time post-calving), parity
- **Quantity:**
  - Feed 150-200 g of IgG (3-4 liter within first 4-6 hr)
  - Gut closure takes place by 24 hours of age
- **Cleanliness:**
  - Free from bacteria (Salmonella, E. coli ( must be < 10,000 cfu/mL), Mycoplasma)
  - Bacteria prevent IgG absorption Total count < 100,000 cfu/mL
- *Do not high heat-treat colostrum, i.e. pasteurization (loss of IgG)*
  - *Gentle heat-treat 140°F for 60 min (reduces bacteria counts)*

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## Factors affecting Ig absorption

- Time of colostrum feeding
- Quality of colostrum ( cow age, vaccinations, # of milkings after calving)
- Amount of colostrum fed
- Stress
  - glucocorticoids cause gut closure
- Season
  - higher absorptive ability in fall



Dr. Kincaid, WSU

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## Passive Immunity

- Failure to obtain passive immunity results in **mortality rates in excess of 50%**
  - Direct economic losses as well as a loss of genetic progress
- Calves with lower levels of passive immunity have decreased growth rates and increased health problems

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## Monitoring Passive Transfer

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- Taking blood samples
  - 12-15 healthy calves; Age: 1-7 days old
  - Measure IgG in serum using refractometer
    - Goal 85% of calves should be 8 mg/mL IgG OR
    - > 6 g/dL total serum protein (depending on the device)
- **Sign of unsuccessful IgG transfer:**
  - calf serum IgG ~ 10 mg/mL 5.5 g/L (@ d 2 -3 of age)
  - IgG total protein IgG < 5.5 g/dL
  - may increase mortality up to 31%-50% by 3 wks of age (Wells 1996)  
USDA 2014, Morrill et al., 2014, Elsohaby et al., 2015)

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## Calf Housing

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- **Clan, dry, good ventilation, prevent calf-to-calf contact (e.g. calf hutches)**
- **Wet and filthy bedding must be avoided**
  - Smooth stone river [6-8 inches]
- **Keep space between calf hutches or use every other pen (when you can)**
- **Place the hutches for south east exposure**

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Courtesy Purdue University

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## Feeding the Young Calf (Liquid Feed)

- **After colostrum feeding:**
  - Liquid: transition milk @ 10% of birth wt. for 3 days thereafter both liquid and dry feed until weaning
  - **Liquid feed**
    - **Transition milk** [high nutrients and inexpensive]
    - **Mastitis milk ??**, [problem w/ *E. coli* or *Pasteurella*]
    - **Milk from treated cow??** [(-) effects on good bacteria]
      - Potential problems with growth rate
    - **Milk replacer**
      - Good choice overall

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## Feeding the Young Calf (Liquid: Milk Replacer)

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- **Milk re-placer (factors to consider)**
  - Price
  - Quality
  - Nutrient analysis
  - Ingredients: Source of protein and energy, source of emulsifiers and stabilizer

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## Feeding the Young Calf (Liquid: Milk Replacer)

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- **Major Nutrients:**
  - Metabolizable energy: 1.71 Mcal/lb
  - ~ 1 lb/day – min 22% protein- 20% Fat

CP: **Min 22%**

Ca: .7 %

Fe: 100 ppm

Vit A: 1700 IU/lb

Ether extract (Fat): 15%

P: .6%

Mn: 40 ppm

Vit D: 270 IU/lb

Mg: .07%

Zn: 40 ppm

Vit E: 90 IU/lb

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## Feeding the Young Calf (Dry Feed)

### Starting 3 days after birth (calf starter)

- **Palatable**
  - Addition of molasses (~7%)
- **Fermented rapidly**
  - Important for VFA's and rumen development
- **Supply required nutrients (80% TDN)**
  - Sufficient fiber and bulk to maintain normal ruminal papillae shape
    - Coarse texture or pelleted, e.g. oats
  - High in energy and protein
    - Corn, barley
    - Fat as long as does not reduce intake
  - Coccidiostate
    - Ionophors

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## Pasteurization of Milk for Feeding Calves

- The primary goal of pasteurization is to reduce the load of possibly pathogenic bacteria fed to calves, thus minimizing the risk of disease transfer.
- Low-dose antibiotics in waste milk can result in a heterogeneous increase in antimicrobial resistance. (Cornell Research)
- Pasteurization is a viable means of degrading antibiotic residues, which could significantly reduce the influence of antibiotic presence in calves' gut flora. (Cornell Research)

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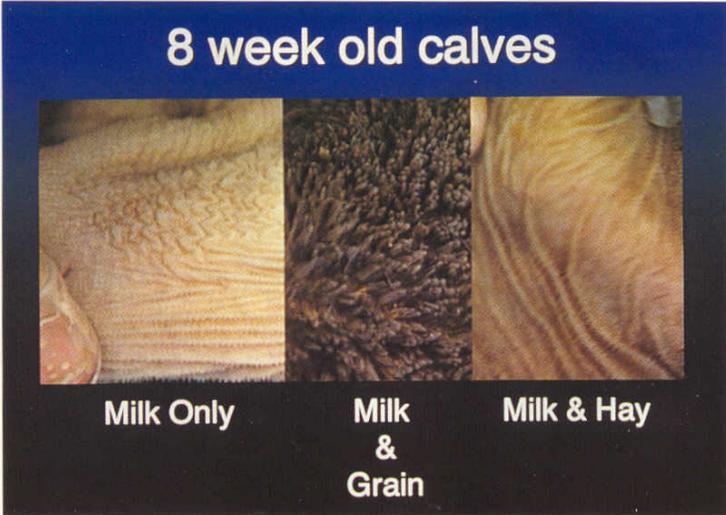
## Extra Points about the Calf Starter

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- **Starter should contain enough coarse ingredients**
  - **Mixture of 20% chopped hay and 80% starter**
- **Starter should always be available**
- **Feed proper amount daily to keep the feed fresh**
- **Keep the starter away from the water bucket**

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**8 week old calves**



**Milk Only      Milk & Grain      Milk & Hay**

THE IMPORTANCE OF FEEDING GRAIN is shown by these photos of rumen interiors. The calf fed both milk and grain has much more developed fingerlike projections. Because of these papilli, the calf has more rumen surface with which to absorb protein, energy, and other nutrients.

**Courtesy of Dr. Kincaid, WSU**

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## Stimulating Rumen Development

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- Fresh water should be available to calf from birth
  - Calves easily dehydrate
  - Free water intake is crucial for maintaining a normal rumen environment
    - Increases dry matter intake

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## Weaning

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- **When to wean a calf**
  - **6-8 weeks of age**
  - ***When calf steadily eats about 1.3 lb of calf starter***
  - ***Gaining .8 lb/day by 6 wks (~ 130-140 lbs)***
- **Small wt. loss after weaning can occur when calves do not consume enough starter**

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## Weaning

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- **Weaning is stressful, do not do other mgt. practices that are stressful**
- **Keep the calf in the hutch for about 10-15 days after weaning**
- **Begin the grower feed**

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## **Calf-hood Health and Disease Management**

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- **Minimize pathogen exposure**
  - **Sanitation**
    - Maternity stall
    - Calves housed in clean, well-ventilated area
  - **Minimizing contacts**
    - Individual housing systems
    - Adequate space between calves
  - **People exposed to calves practice good hygiene**
    - Care for calves prior to older animals
    - Develop chore routine to minimize pathogen transmission

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## **From Weaning to Breeding**

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- **Maintain adequate growth to ensure breeding at desired age**
- **Ability to control gain during this time is the key to success**
- **Poor feeding programs will result in:**
  - ✓ **Low daily gain**
  - ✓ **Delay in puberty**
  - ✓ **Delay in breeding**
  - ✓ **Delay in first calving**
- **Over feeding will result in:**
  - ✓ **Excessive daily gain**
  - ✓ **Excessive BW may inhibit mammary development**

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## Managing Heifer Development

### Goals:

- Provide replacements for cows leaving the herd
- Improve genetics and production
- Raise heifers efficiently and economically

- I. Age at calving
- II. Body size at calving
- III. Controlling Expense – feed and labor
- IV. Ease of care
- V. Optimizing Health

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## Accelerated Heifer growth

- Feeding Higher amounts of properly formulated (30% CP) milk replacers
- Time: during the first four to six weeks of life; 2 lb of dry milk replacer
- ADG 2.0-2.2 lbs/Day

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## Goals for Heifer Management

Parameter	Brown Swiss & Holstein	Ayrshire & Guernsey	Jersey
Mortality (%)	<5	<5	<5
Weaning age (weeks)	6-8	6-8	6-8
Average daily gain (lbs./day)	1.6-1.8	1.4-1.6	1.2-1.4
Maximum prepubertal ADG (lbs./day)	1.8	1.6	1.4
Average age at first breeding (months)	14	14	12
Weight at first breeding (lbs.)	800	650	550
Wither height at first breeding (inches)	50	46	43
Services per conception	1.5 - 1.8	1.5 - 1.8	1.5 - 1.8
Age at first calving (months)	24 - 26	24 - 26	22 - 24
Postcalving weight (lbs.)	1250	1000	800
Peak milk production (lbs./day)	70	60	55

Adapted: D. R. Winston, Virginia Tech

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### GROWTH STAGES

Age	Weight (Lbs.)	Average Daily Gain (Lbs.)	Percent Death Loss	Percent Culled
Birth to 3 Days	90 to 100		2 to 5	
Liquid Feeding	160 to 180	1.2 to 1.4	2 to 10	
Weaning to 7 Mo.	450	1.7 to 2.2	1 to 2	4 to 5
7 Mo. to Breeding	880	1.7 to 2.2	<1	1
Breeding to Calving	1366	1.5 to 2.2	<1	1 to 2

*A very good program has 90 percent of the heifers born alive enter the barn as springers.*

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**5 Benchmarks  
for Calf Health**

- ✓ *Maximum 10-15% morbidity*
- ✓ *Maximum \$15/calf treatment cost*
- ✓ *Maximum 1-2% death loss*
- ✓ *At least double birth weight by weaning*
- ✓ *Minimum height growth by weaning: 4" for Jerseys, 5" for Holsteins*

Tom Earleywine,

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**Benchmark #1:**

**Maximum 10 percent morbidity**

sickness rate

- Record and divide the number of calves treated (anything) or died each day by the total number of calves fed that day.
- keep an eye out for large spikes

Causes:

- Colostrum: timing, quality, quantity
- Nutrition (milk amount, freq., and constant)
- Hygiene: maternity, equipment, pens, waterers
- Air quality: ventilation....

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### Benchmark #2:

Maximum \$15  
treatment cost  
per calf

- Maximum of \$15 of treatment costs per calf from birth through weaning.
- The total cost associated with treating all calves on a monthly or, better yet, a weekly basis.
- **Analyze:**
  - evaluate the same factors associated with spikes in morbidity rate (nutrition, cleaning or sanitation, ventilation and colostrum).
  - Overtreatment may also be to blame.

Too aggressive in treating loose manure

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### Benchmark #3:

Maximum 3  
percent death  
loss

- Strive for a death loss of zero, but know that a maximum of 1 to 2 percent death loss is normal.
- Dividing the number of calves lost from birth to weaning by the total number of calves born in that same time frame (wkly would be better).
- High spikes: work with veterinarian and collect blood and fecal samples or deep

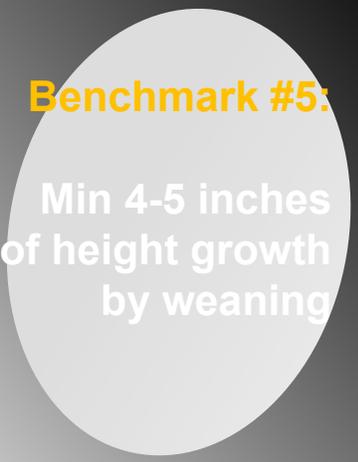
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**Benchmark #4:**  
Target for at least double birthweight by weaning

- Weaning weight directly impacts overall heifer growth
- Watch for amount and nutrient contents of the milk or milk replacer (~10% BW, 2.5 quarts per feeding, 2X)
  - May consider increase the milk amount
- Watch for calf health

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**Benchmark #5:**  
Min 4-5 inches of height growth by weaning

- Strive for min of 4 - 5 inches of height growth prior to weaning (~32")
- If there is a shortcoming:
  - Review nutrition (calf starter and milk replacer)
  - less than 22% protein DM
  - Low fat/low energy diet
  - Not enough milk

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## Events/2 (Calf Table)

Month	Fresh	None	Twins	%T	Male	Female	%F	Alive	Dead	%D	M:Dead	%M	F:Dead	%F	Sold	DCC
Jan08	13	0	0	0	7	6	46	13	0	0	0	0	0	0	7	1
Feb08	127	0	4	3	68	62	48	119	11	8	10	15	1	2	61	5
Mar08	114	1	6	5	63	53	46	107	9	8	6	10	3	6	59	2
Apr08	107	2	3	3	52	53	50	95	10	10	6	12	4	8	47	4
May08	119	2	3	3	52	60	54	108	4	4	3	6	1	2	51	5
Jun08	158	0	9	6	82	77	48	147	12	8	6	7	6	8	79	9
Jul08	257	2	23	9	153	120	44	254	19	7	13	8	6	5	148	20
Aug08	199	0	8	4	104	97	48	183	18	9	15	14	3	3	93	23
Sep08	233	0	13	6	134	106	44	221	19	8	12	9	7	7	130	19
Oct08	198	1	16	8	110	95	46	194	11	5	7	6	4	4	103	19
Nov08	180	2	6	3	97	80	45	167	10	6	7	7	3	4	91	10
Dec08	261	0	13	5	128	140	52	256	12	4	6	5	6	4	128	23
Jan09	220	0	19	9	141	95	40	211	25	11	19	13	6	6	126	10
<b>TOTAL</b>	<b>2186</b>	<b>10</b>	<b>123</b>	<b>6</b>	<b>1191</b>	<b>1044</b>	<b>47</b>	<b>2075</b>	<b>160</b>	<b>7</b>	<b>110</b>	<b>9</b>	<b>50</b>	<b>5</b>	<b>1123</b>	<b>150</b>

151 Cows and 151 Events skipped because the events occur prior to arrival

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## Breeding Age Heifers

- **Breeding age (13-14 months)**
  - **Body condition score**
  - **Wither height measurement**
  - **Balanced ration: ~19-20 lb DM**

**CP: 13-14 %DM**

**TDN: 65% DM**

**ADF: 32% DM**

**RUP: 20% of CP**

- **Make sure that heifers do not loose BW and body condition at this stage.**

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## Parasite Control

- Heifers with heavy parasite loads decreases feed efficiency and may develop diarrhea and anemia
- Bedded manure packs should be cleaned often and thoroughly
- Coccidiosis is common internal parasite
  - Oocytes are ingested and penetrate gut of heifer
    - Results in impaired feed efficiency and diarrhea
  - Ionophores prevent and control coccidiosis

Tyler and Ensminger

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## Breeding and estrous Synchronization

- **Start breeding at 13 months of age**
  - This provides 3 insemination opportunities by 15 months of age
- Implement a strong visual observation schedule for detecting heat
- Implement a systematic breeding program (**DO NOT USE OvSynch !!**)
- Keep a good record of pregnancy and conception rates
  - **Acceptable CR = 65%**      **CR goal = >80%**

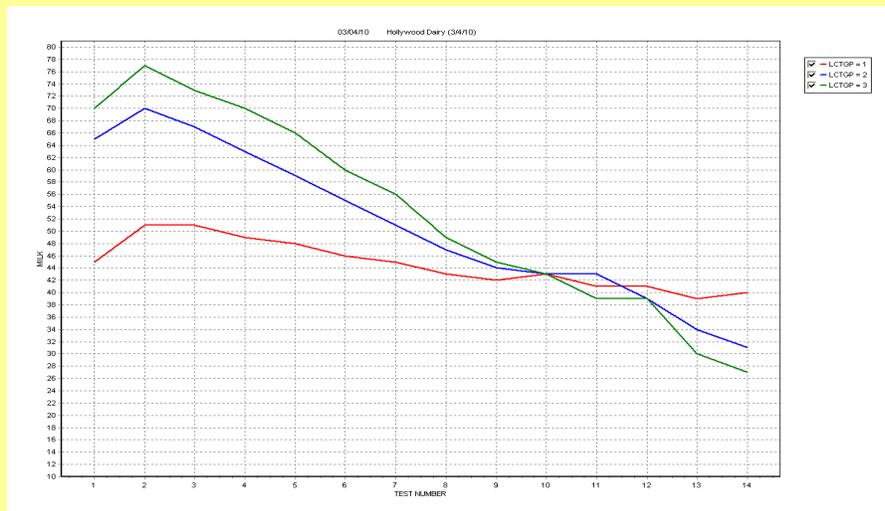
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## Compared production, peak milk, 305 ME and milk componentes

By LCTGP	Pct	Count	Av MILK	Av305ME	AvPMILK	Av PCTF	Av PCTP
1	31	731	77	24891	81	3.5	3.2
2	29	685	91	26622	92	3.5	3.2
3	41	977	95	25629	99	3.5	3.2
=====							
Total	100	2393	89	25684	91	3.5	3.2

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