

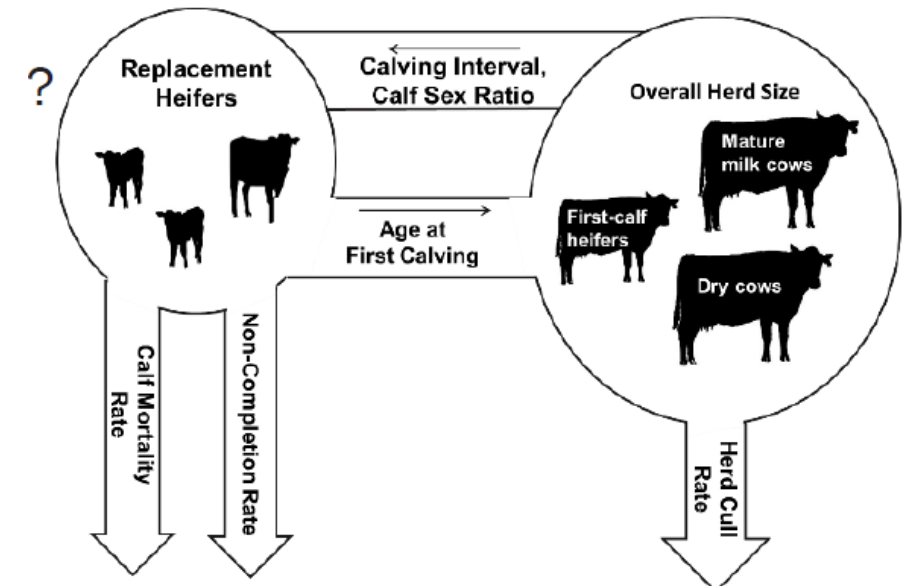


Euroopa Maaelu Arengu
Põllumajandusfond:
Euroopa investeringud
maapiirkondadesse

Efficiency in heifer growing

10 March 2021

Zanetta Chodorowska TSM Ruminant



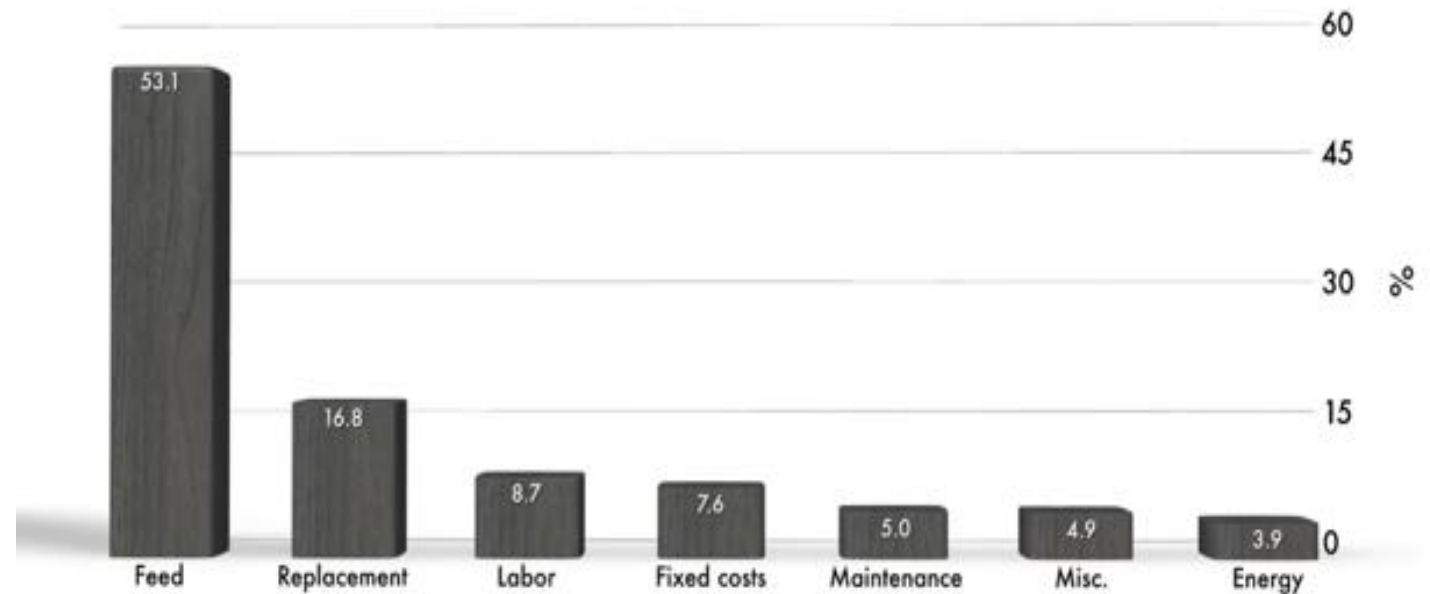
Feed costs are the largest cost input for heifer production (>60%)

Heifer feed costs >15-20% of total farm expenses

Efficiency of Milk Production

EMP is influenced by the

- The quantity and quality of heifers,
- The quantity and quality of dry cows,
- The length of the dry period,
- The length of the rearing period,
- The quality and adequacy of the feeds provided,
- The environmental conditions,
- The longevity of the cows,
- The amount of feed that is wasted or spoiled, and still other factors.



The most relevant contributors to EMP is feed efficiency

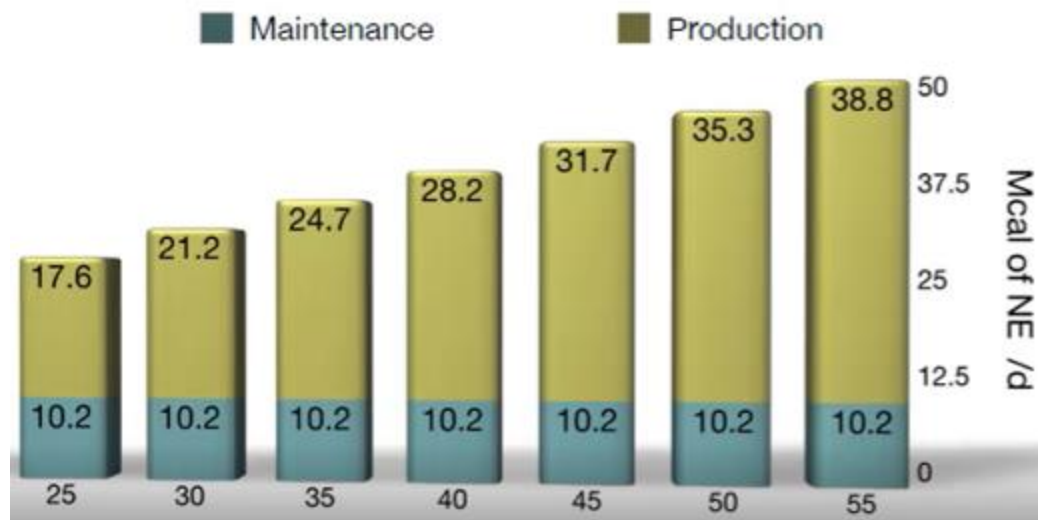
Journal of Dairy Science

Volume 103, Issue 6, June 2020, Pages 5709-5725

Gableret al., 2000

FE in dairy cattle has been doubled last 50 years

Despite the fact that FE has not been selected



VandeHaar et al.,2016)

EMP impacts

1. Dairy herd profitability,
2. The environmental impact of milk production.

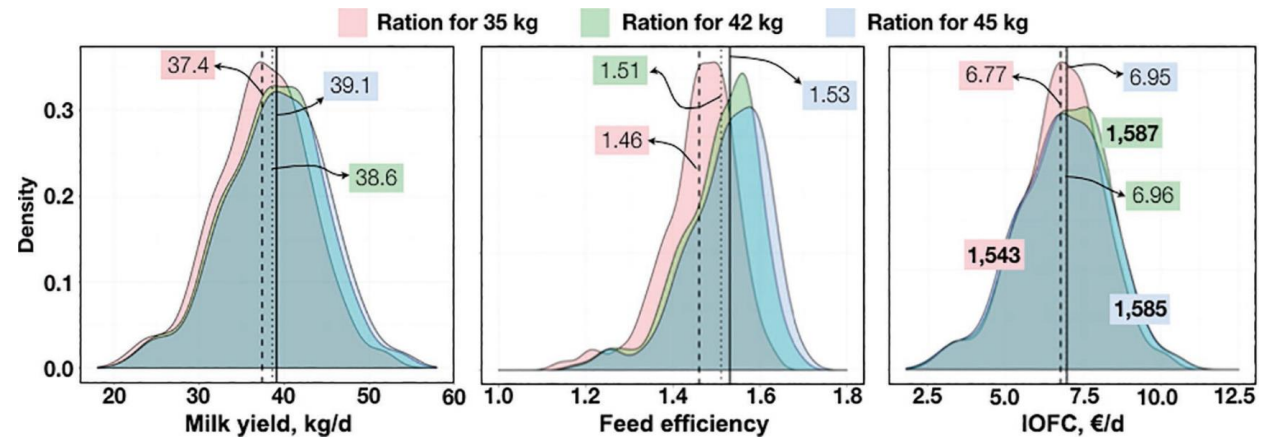
Improvements in profits reduced the gap between cost and income,

Reduced impact on environment by diverting a greater proportion of nutrients to milk yield (diluting maintenance requirements);

The amount of feed used by the US dairy industry (and that of other countries also) to produce 1 L of milk today is 80% less than it was 75 years ago ([Capper and Bauman, 2013](#)).

Feed efficiency of lactating animals

- Milk/DMI
- FCM/DMI
- N intake /N secreted in milk
- Residual Feed Intake (RFI) the difference between observed and predicted DMI
- IOFC Milk income /feed cost
- Feed cost/cwt (every 100kg of milk produced)



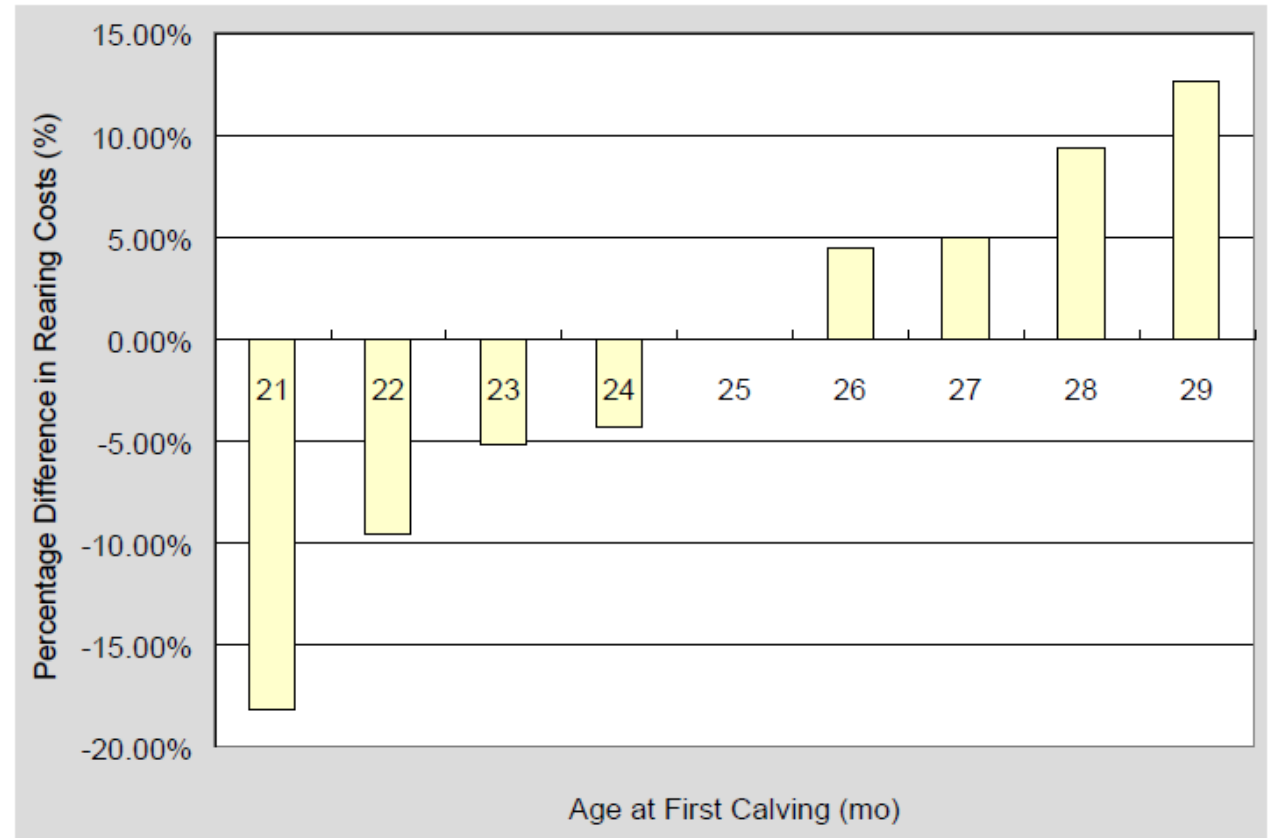
What about heifers

Development of heifers 4 months – 2 years

Heifer Targets:

- Size when bred 55% mature weight
- When to calve 82% matured weight
- When to breed 13-15 months
- When to calve 22-24 months
- Calving interval 13.3 months

Costs of Age at First Calving



Tozer and Heinrichs, 2004

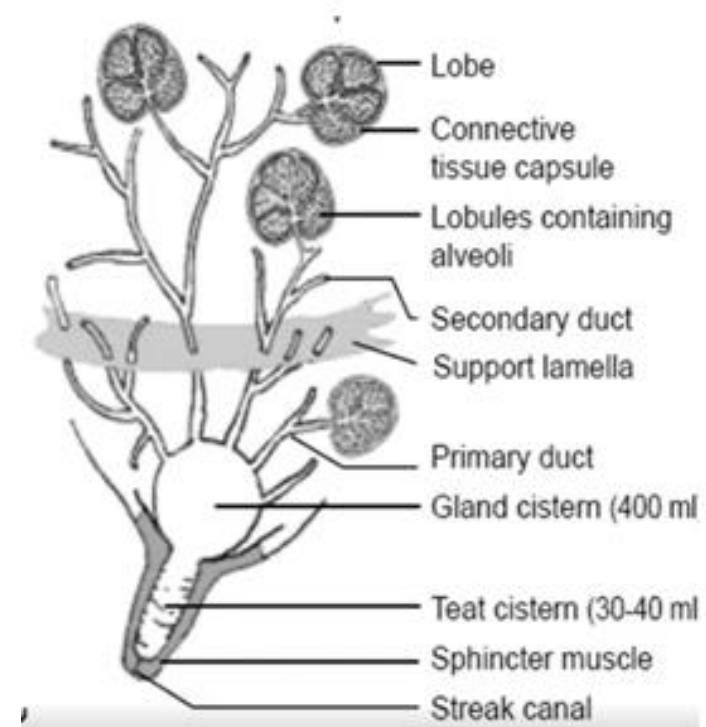
Development of heifers 4 months – 2 years

Mammary Growth Periods

Not just change in body size

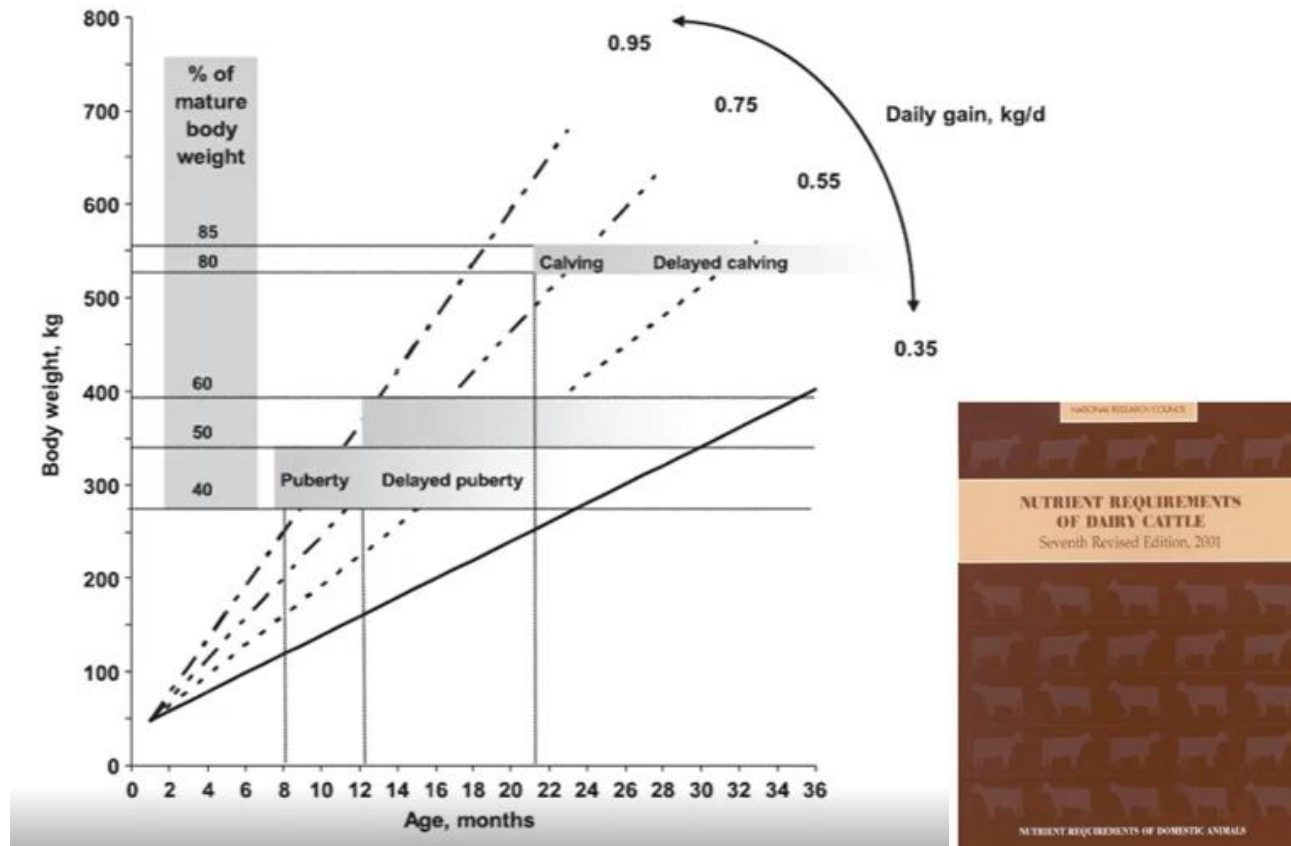
1. Digestive system
2. Puberty/Reproduction
3. Mammary

- Basic structures formed in utero.
- Birth to 3 months.
- 3 months to puberty epithelia structures form and invade fat pad.
- Puberty to conception: isometric, but limited development.



Puberty and ADG

The effect of different DG to puberty service and calving



Heifers requirements

0.23Mcal of ME /kg BW^{0.75}

1.84gN/kg BW^{0.75}

- 14-15%CP per-puberty based on 2.15% BW DMI/d
- 13-14% CP post puberty based on 1.65% BW DMI/d

LeCozler et al., 2008

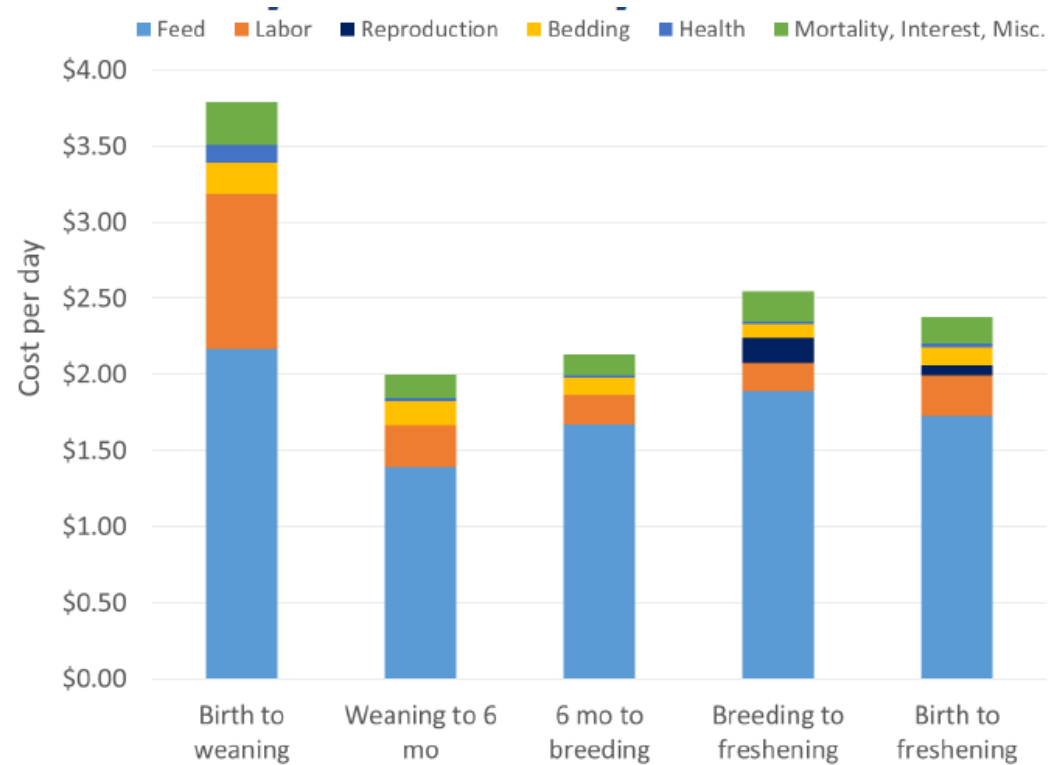
Feeding cost & strategy

Overall Goal

Assure you are meeting heifer nutrient requirements avoiding over feeding energy and protein

1. Limit- feeding /Target feeding
2. Ad- libitum TMR – using fiber
3. Component feeding – using fiber

Average heifer rearing costs Pennsylvania survey, 2011



Heinrichs et al., 2014

Ad- lib TMR feeding



Very common

Must be high forage

- Gut fill assure energy intake will not be excessive

Feed for 5-10% refusals

Recommended for older heifers approaching calving

Pros

More flexible on uniform group

Better rumen health – stable

Bank space less of concern

Cons

Wasted feed

Less efficient nutrient digestion

Some heifers over conditioned

Limit-feeding

Pros

- FE and nutrient utilization
- No feed waste
- More controlled
- Doesn't have negative impact on growth of heifers (Zanton 2007)
- Lactation performance is mentioned

Con

- Must weight heifers regular to monitor ADG
- Frequently adjust feed amount (weekly or every second week)
- Bunk space 48cm /older heifers
- Heifers need to adapt
- Consider type of bedding

Component feeding

Give a grain mix pallet once or twice a day and then allow ad lib intake of hay/forage or pasture



Pros

Less time at feeding

Less feeding equipment

Easy to adjust grain mix

Cons

Rumen pH/health

EF nutrient utilization?

Need adequate feeder space

Guidance for driving heifer contracts

By [MAUREEN HANSON](#) March 2, 2021

Penn State University dairy Extension specialists recommend considering:

- Expectations of the dairy, including colostrum delivery, navel dipping, identification and vaccination.
- How death loss is defined, who takes responsibility for it.
- Which party maintains cattle insurance.
- Vaccination protocols and who pays for the vaccines.
- Breeding management, semen selection and expense responsibility.
- Clearly defined growth goals.
- Performance reporting expectations.
- Management of BVD testing and BVD-PI-positive animals.
- Expectations and protocols for genomic testing.
- Authority for grower to reject animals on arrival.
- How lack of payment will be rectified.
- Terms of visiting/inspecting animals (i.e., any time, or by appointment).
- Arbitration plans if conflicts arise.

Guidance for Drafting Heifer Contracts That Stick



Summery

Michael Overton, DVM, MPVM

- Many herds carrying a large excess of heifers to the needs
- There are trying to determine which ones to cull and when
- It is costly
- But using growth performance information excess heifers can be culled, leading to better quality at calving

Questions on heifers growing

Previously

Should we bred everything ?

Kept all heifers that did not die ?

Currently - options

Conventional semen

Sexed semen

Embryo Transfer

Beef semen

Which cows should produce replacements ?

1. Which heifers do we keep?
2. When do we cull heifers that we do not need?
3. How many cows (and which) should we cull if ?

How many heifers do I need Heard Turnover assuming stable heard size

Heard turnover :

No of Cows (dry & milking) that leave the heard

Average no of Cows (milking & dry) for the year

Wide range of observed values < 20% to >50%

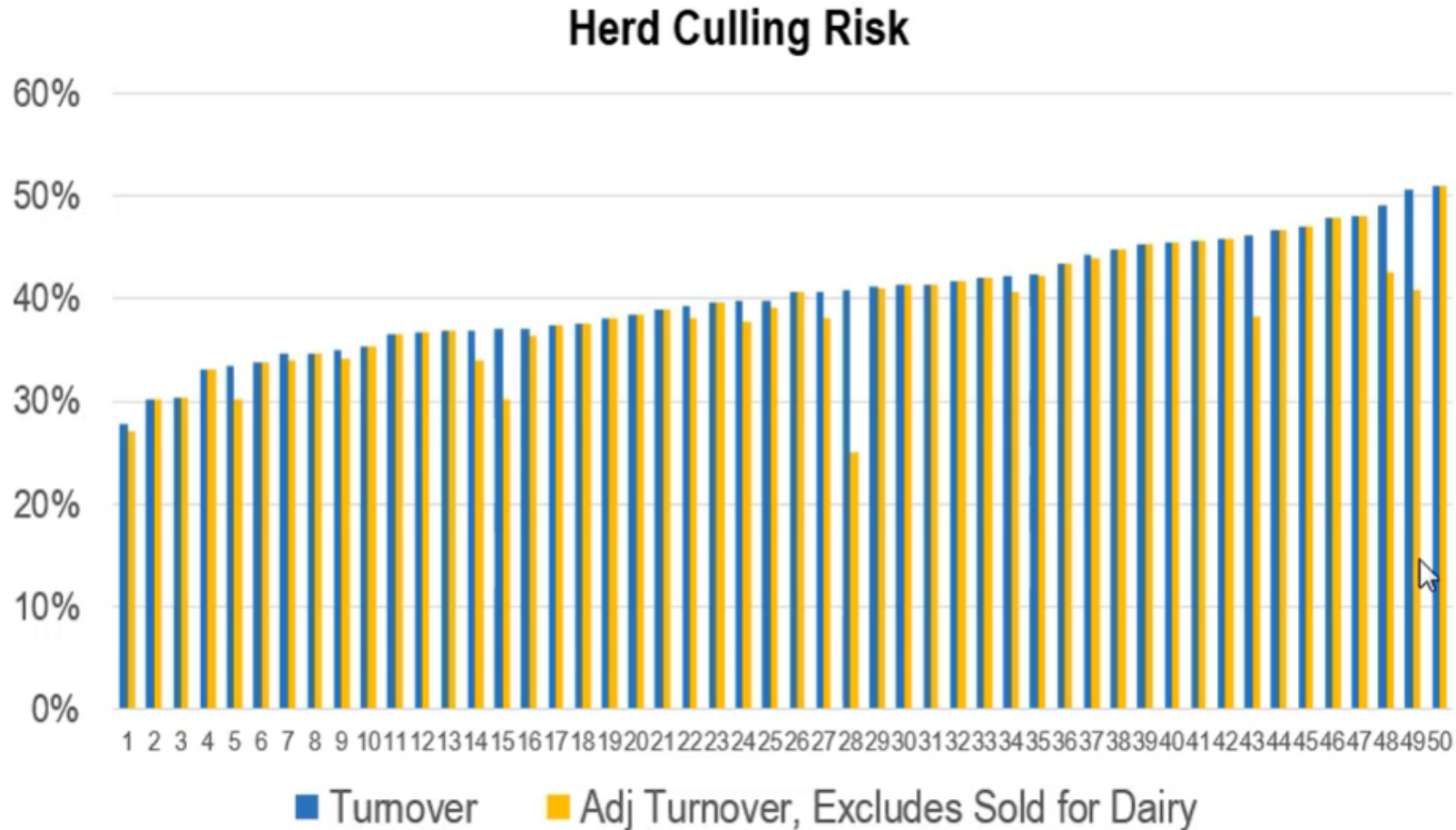
Very commonly observed US 35% to 45%

Very commonly used in EU 30% to 35 %

What is correct ?

Based on genetic progress would be about 12 – 20%

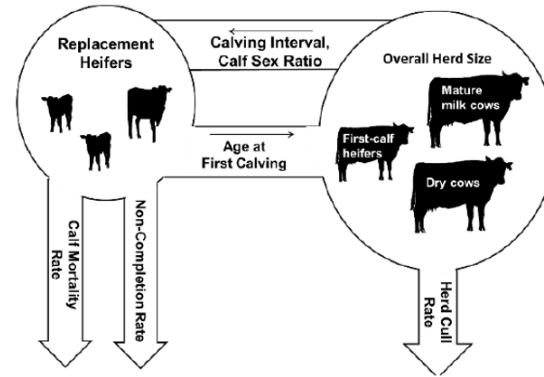
Holsten Data Set DDAS System (means 38-40%) Data only from US / inconsistent



Closed production system of dairy farm

Replacement heifers -----> Dairy Herd -----> Sold & Dead Cows

- Improve reproduction
- Improved performance
- Sexed semen



- Disease
- Lameness
- Reproduction
- Genetic potential
- Economic opportunities

1. There is a certain capacity on the farm for animals handling
 1. Too many, overcrowded, decrease performance
 2. Too few, inefficient fixed costs
2. Improve the management to reduced risk of losing value premature cows due to infertility, laminitis, disease, metabolic etc.
3. Culling should be driven by economics

What factors Impact the number of heifers produced

1. Reproductive performance heifers and cows
2. Semen used – conventional, sexed or beef
3. Stillborn (DOA) risk – heifers and cows
4. Heifer growth, health, and losses

Early

- Birth till weaning
- Weaning till breeding

Late

- Post breeding

Pregnancy rate on past and today

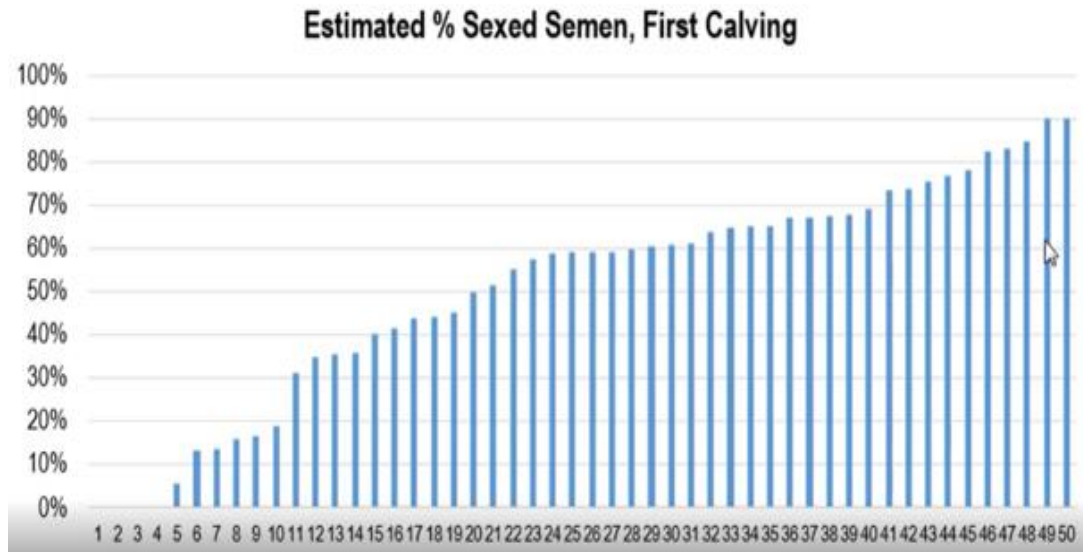
Past

- Pregnancy rate in a past 10 years ago was 18-19%
- Expected heifer calves was 46-48%
- Farms purchased heifers
- Heifer turn over was limited

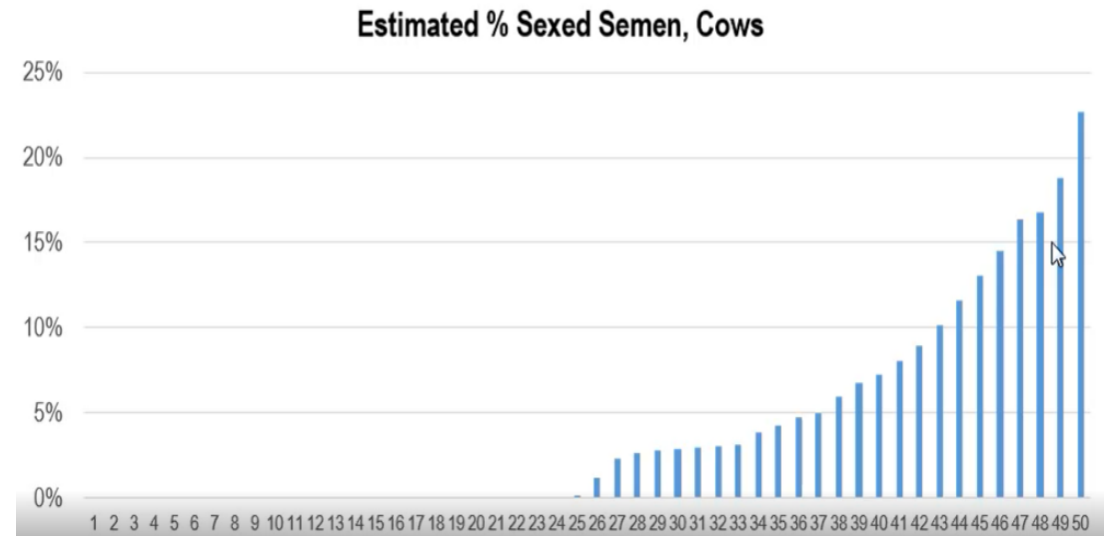
Today

- Pregnancy rate today is about 21%
- There are more options
- 90% of expected heifer calves with sexed semen

Estimated Proportion of Pregnancies with Sexed Semen (Heifers v. cows Calving)



Mean 48-51%



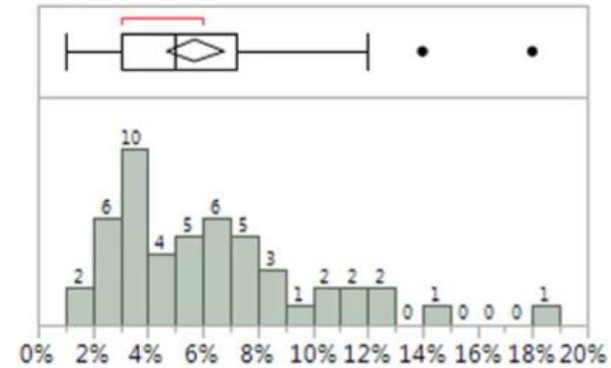
Mean 4%

Heifer number typically drive Heard Turnover

What drives the number of heifers produced ?

1. Reproductive performance – heifers and cows
2. Used semen
3. Stillbirth(DOA) risk – heifers and cows
4. Heifer losses
 - Birth – weaning
 - Weaning – breeding pen
 - Breeding
 - Post breeding – calving

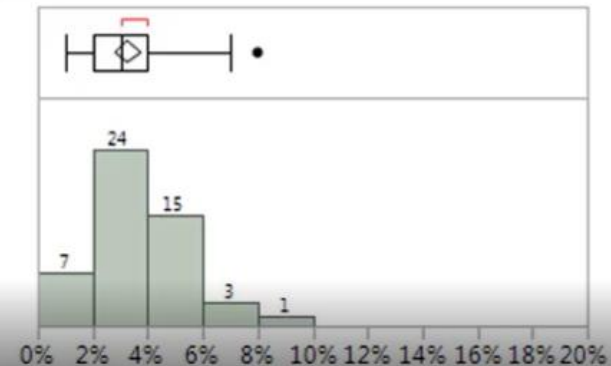
F DOA Risk, Heifers



Summary Statistics

Mean	0.0574
Std Dev	0.036186
Std Err Mean	0.0051175
Upper 95% Mean	0.067684
Lower 95% Mean	0.047116
N	50

F DOA Risk, Cows



Summary Statistics

Mean	0.0328
Std Dev	0.015913
Std Err Mean	0.0022504
Upper 95% Mean	0.0373224
Lower 95% Mean	0.0282776
N	50

Heifers lost by 14 months 16%

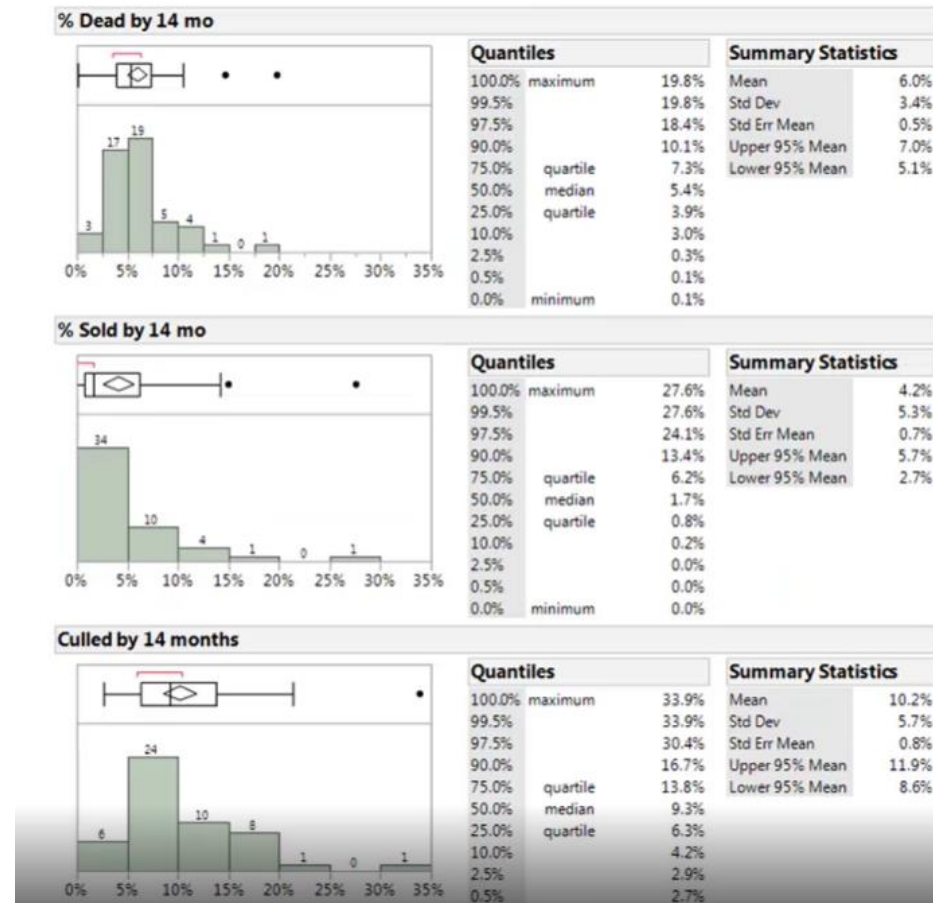
Heifer losses

Early by 14 month

- Birth – weaning
- Weaning – breeding pen
- Breeding

Late

- Post breeding – calving



Heifers achieving pregnancy 84% 78% enter the herd after calving

On average :

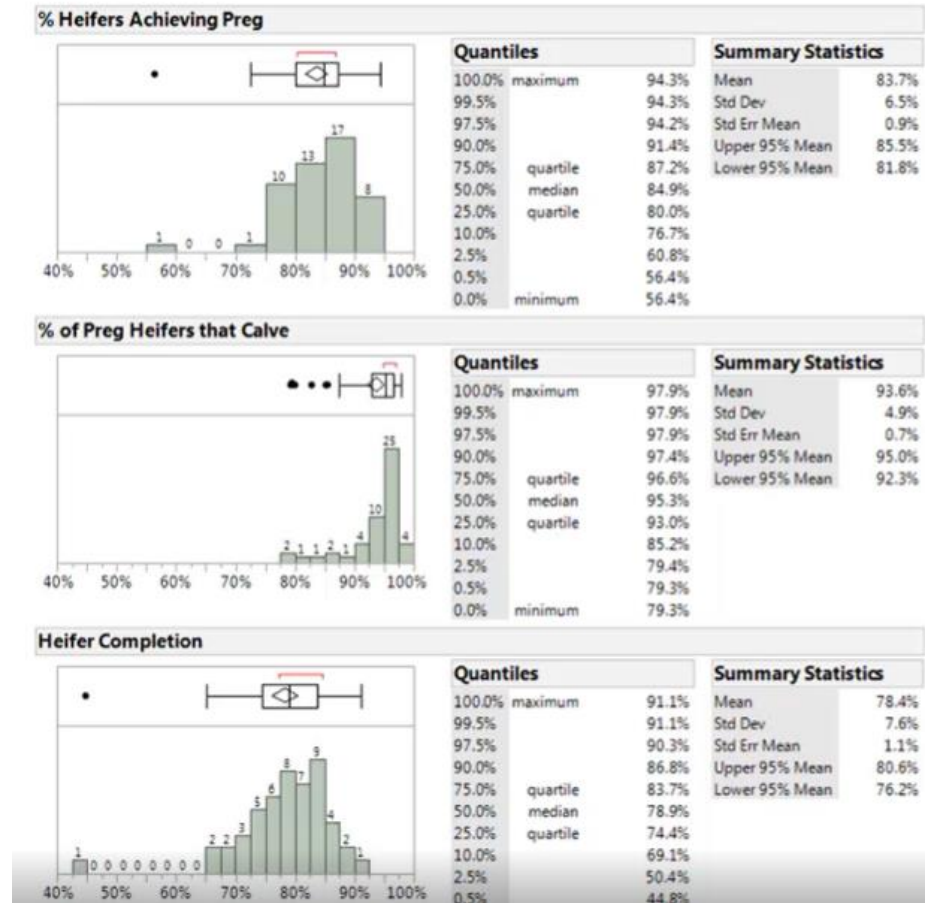
16% of heifers failed to achieve a pregnancy due to

- Mortality
- Culling chronic disease
- Repro failure

6% of pregnant heifers failed to calve

- Abortion losses
- Late culls ex. over conditioned
- Late mortality

78% of heifers entering program actually calved



Heifers that conceive – drive the number heifers that are needed /management and feeding

How many heifers are needed annually?
(results of 50-herd data set)

Milking and dry cows	1000
Herd turnover	39%
Cows culled = heifers need to calve	390
% Heifers that conceive	87,3%
% Preg Heifers that Calve	93,6%
% of heifers calving	78,3%
No. of Live heifers born	498
DOA Risk	5,7%
No. of heifer Birth needed	528

How many heifers are needed Annually

Scenarios for consideration

Milking and dry cows	1000	1000	1000	1000	1000	1000	1000
Herd turnover	39%	30%	40%	50%	40%	40%	40%
Cows culled = heifers need to calve	390	300	400	500	400	400	400
% Heifers that conceive	87,3%	84%	84%	84%	84%	75%	90%
% Preg Heifers that Calve	93,6%	94%	94%	94%	94%	94%	94%
% of heifers calving	78,3%	78%	78%	78%	78%	70%	80%
No. of Live heifers born	498	383	511	638	511	570	475
DOA Risk	5,7%	5,7	5,7	5,7	6,0	5,7	5,7
No. of heifer Birth needed	528	406	541	677	543	604	504

Heifers prices

- Due to a combination of: excess heifer inventory and low milk prices replacement heifer values and are well below actual cost of production
- The cost of raising heifers is often above their market value. A slide rule* for heifer raising costs at various weights with labor included would be \$2.33 per head per day at 360 kg

	Jan-18	Oct-18	Jan-19
Arizona	\$1,700	\$1,450	\$1,250
California	\$1,500	\$1,200	\$1,100
Florida	\$1,530	\$1,260	\$1,250
Idaho	\$1,600	\$1,350	\$1,120
Michigan	\$1,600	\$1,400	\$1,180
Minnesota	\$1,500	\$1,200	\$1,050
New York	\$1,750	\$1,450	\$1,040
Ohio	\$1,450	\$1,100	\$1,000
Pennsylvania	\$1,440	\$1,400	\$1,050
Texas	\$1,600	\$1,450	\$1,300
Virginia	\$1,370	\$1,120	\$970
Wisconsin	\$1,470	\$1,180	\$1,120
US	\$1,520	\$1,230	\$1,140

Estimating the Cost per Heifer Raised

Assumptions used in the model:

New born heifer value \$160

Birth weight 44kg

Breeding weight 442kg

(57% of mature weight & 51WH)

Labor/hr \$15

Interest 6%

AI cost/service \$18

Large dairy using hutches, 100%MR, outdoor housing, and TMR feeding

Estimated Cost of Raising Heifers

Stage	Culling Strategy					
	Hutch	Post Wean	Growing	Breeding	Post-breeding	Close-up
Age in months	Birth to 2	2 to 4	4 to 10	10.0-15.7	15.7-21.4	21.4-23.4
Mortality	3.50%	1.75%	1.00%	0.50%	0.30%	0.25%
Culled (sold)	0.0%	0.0%	0.0%	0.0%	7.0%	0.0%
Colostrum*	\$16					
Milk*	\$166					

Cumulative Cost by End of Each Stage						
Hutch	Post Wean	Growing	Breeding	Post-breeding	Close-up	
Birth to 2	2 to 4	4 to 10	10.0-15.7	15.7-21.4	21.4-23.4	
\$303	\$421	\$748	\$1,179	\$1,664	\$1,939	
\$4.80	\$3.46	\$2.46	\$2.46	\$2.56	\$2.73	
\$365	\$485	\$816	\$1,248	\$1,741	\$2,017	

Entering Weight (kg)	40	90	148	319	470	608
Exit Weight (kg)	90	148	319	470	608	655
Average daily gain (kg)	0.79	0.98	0.94	0.87	0.81	0.76
Cumulative ADG (kg)	0.79	0.88	0.92	0.90	0.87	0.86
Cumulative from birth						
Total Cost*	\$303	\$421	\$748	\$1,179	\$1,664	\$1,939
Cost/ Day*	\$4.80	\$3.46	\$2.46	\$2.46	\$2.56	\$2.73
Cost Including Wet Calf*	\$365	\$485	\$816	\$1,248	\$1,741	\$2,017

Heifer Raising Costs in 2019

- \$2,241 over 24-month period.
- Reduce the heifer raising period from 24 months to 23 months saves \$93 per heifer.
- For a 100-cow herd raising 40 replacements each year, this savings equal \$3,720 per year

by Larry Tranel, Dairy Field Specialist, Iowa State University Extension

<i>*Itemized Costs -- 2017</i>		Heifer Raising Budget	
		1 Heifer	for 24 months
Feed Costs (DM = Dry Matter)		Feed Costs	
Hay/Haylage - DM	\$621.18	4.00	ton
Pasture Forage - DM	\$0.00	0.00	ton
Corn Silage - DM	\$270.83	2.50	ton
Corn Equivalent - US No. 2	\$64.35	18.00	bu.
By Product Feed			
Protein Supplement	\$95.29	550.00	lb.
Salt and Minerals	\$2.75	50.00	lb.
Fat Supplement	\$0.00	0.00	lb.
Milk Replacer/Calf Feed	\$112.20	120.00	lb.
	\$1,167	7.98	DM ton/hd
Livestock Costs		Livestock Costs	
Dairy Supplies	\$10.00		head
Freight/Trucking/Hauling	\$5.00		head
Veterinary & Medicine	\$70.00		head
Breeding Fees	\$42.00		head
DHIA/Accounting/Legal	\$3.00		head
Marketing	\$1.00		head
Bedding Costs	\$100.00	1	ton
Gas/Fuel/Oil	\$10.40	4	gal.
Electricity	\$17.00	170	kWh
Other (oper. int., phone)	\$10.00		head
Facilities & Equipment Costs		Facilities & Equip Costs	
Milking Center/Parlor			
Dairy Housing			Cost/Head/Day
Manure Storage	\$21.60	\$0.03	head
Heifer Housing	\$163.80	\$0.23	head
Machinery and Equipment	\$55.22	\$0.08	head
		\$2.30	Cost/head/day
		\$2.67	with labor included
Cow Ownership Costs	\$110.00		Ownership Cost/hd
Heifer Replacement Costs	\$175.00		Initial Calf Value
Labor and Mgt Costs	\$275.00	22.00	hrs/hd
		\$2,241	Total Cost (24 mon)
		\$2,241	24 Mon. Cost

ISU Extension Dairy Budget
www.extension.iastate.edu/dairyteam

The cost of extra culling during the raising period

- Assumptions:
- Same baseline assumption as before
- Same mortality risk by stge
- Initial heifer population = 1000
- 50 culled after weaning
- 40 culled after the grower period
- Cull values based on projected body weight at time of culling and published market values

Culling Loss Estimates

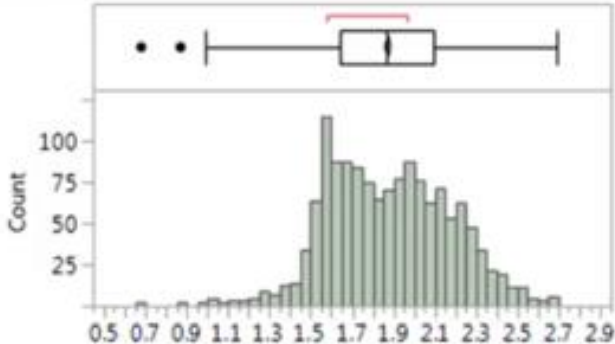
Starting age	0.0	2.1	4.1	10.1	15.8	21.5
Ending Age (mos)	2.1	4.0	10.0	15.7	21.4	23.4
Number of performance culls for stage	0	50	40	0	0	0
Median days to cull for stage	63	14	14	30	60	14
Total Cost for heifer completing stage	\$365	\$497	\$847	\$1,290	\$1,797	\$2,080
Weight of cull (kg)		104	161	345	519	619
Beef value (\$/kg)		\$2.10	\$1.84	\$1.79	\$1.75	\$1.98
Beef value (\$/head)		\$218	\$295	\$618	\$907	\$1,175
Cost of raising to point of cull		-\$415	-\$532	-\$923	-\$1,448	-\$1,837
Loss per heifer culled		-\$197	-\$237	-\$305	-\$541	-\$662

Can we use farm records to improve culling decision

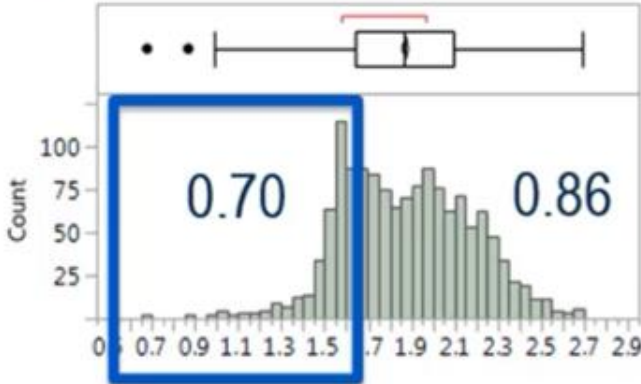
- What data are useful predictors?
- What impacts does culling same heifers on the cost of the one that stay and complete the process ?
- What is the value of data from the raising period on first lactation performance?
- ADG till weaning
- ADG till 120
- ADG till 160
- Plus create culling criteria (age of first calving, calving month, performance)

ADG/PTAM

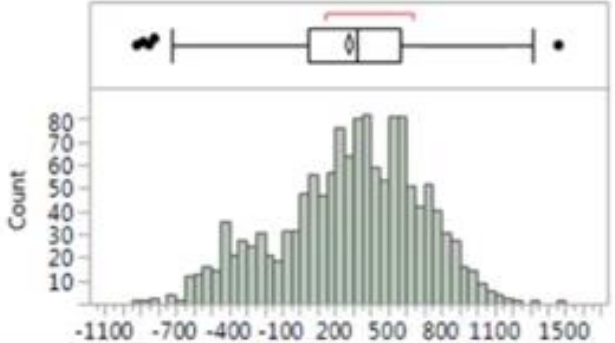
CDG2



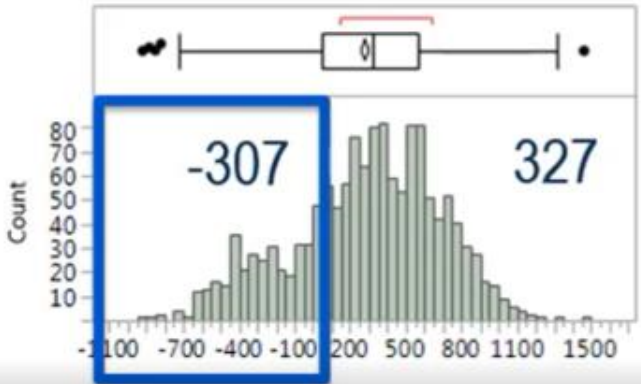
CDG2



PTAM



PTAM



Heifers raising costs and questions ..

- \$5-6 per calf/day from birth till weaning typically costs to raise a calf,
 - At weaning 56-day period typically has an estimated \$336 of expenses,
 - \$2,4 per animal/day from weaning-to-calving is \$1,620 over 674 days.
- What if I have too many heifers today (current young stock plus pregn.)
- Option:
- - Do nothing
 - Sell springers if the price is better
 - Cull more cows
 - Expend heard
 - - Cull same heifers
 - Which I should cull
 - When I should cull
 - Plan to breed more selectively

