Extension
UNIVERSITY OF WISCONSIN-MADISON

DAIRY WORKERS'

TRAINING MODULE 2

REPRODUCTIVE SKILLS

Heifer Reproduction Management

1

Heifers…
An investment in the future dairy herd

- High quality dairy replacements for improving genetic progress
- Heifer raising is the second largest expenditure on the farm

Extension
UNIVERSITY OF WISCONSIN-MADISON

2

Critical control points

- Keeping heifers healthy
- Meeting growth goals
- Lowering calving age
- Lowering cull rates
- Improving labor management

Extension
UNIVERSITY OF WISCONSIN-MADISON

3

Largest factor influencing heifer costs

Age at first calving

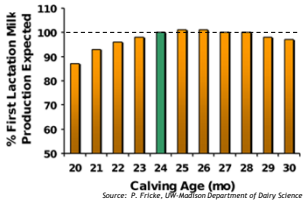
- Heifer housing
- Feed
- Labor
- Management

Extension UNIVERSITY OF WISCONSIN-MADISON

4

Calving age influences subsequent milk production

- Calving heifers at 23 to 24 months of age is optimal for first lactation milk yields
- Although heifers can calve at 19 to 21 months of age, they may experience dystocia and metabolic disorders



Source: P. Fricke, UW-Madison Department of Dairy Science

Extension UNIVERSITY OF WISCONSIN-MADISON

5

Age at first calving and cull rate affect herd size

Number of dairy replacements needed for a 100-cow dairy

Cull rate (%)	Age at first calving (months)				
	22	24	26	28	30
26	53	58	63	67	72
30	61	66	72	78	83
34	69	76	82	88	94
38	77	84	92	99	106
42	86	93	101	109	117

Source: Penn State University, www.extention.org/Heifer_Economics

Extension UNIVERSITY OF WISCONSIN-MADISON

6

Age at first calving affects herd size

If 250 dairy replacements are needed when freshening age is 24 months, 260 replacements are needed when freshening age is 25 months

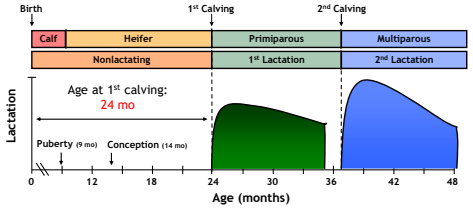
Age at freshening (months)	Change from 24 months (%)
22	-8.4
23	-4.2
24	0
25	+4.2
26	+8.4
27	+12.6
28	+16.8
29	+21.0
30	+25.2

Source: Penn State University Management of Dairy Heifers http://extension.psu.edu/animals/dairy/nutrition/heifers/heifer-feeding-and-management/management-of-dairy-heifers

Extension UNIVERSITY OF WISCONSIN-MADISON

7

Heifer development: Age at 1st calving 23-24 months



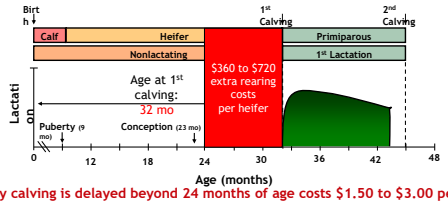
Optimal age at calving = 23-24 months

Source: P. Fricke, UW-Madison Department of Dairy Science

Extension UNIVERSITY OF WISCONSIN-MADISON

8

Heifer development: Age at 1st calving 32 months



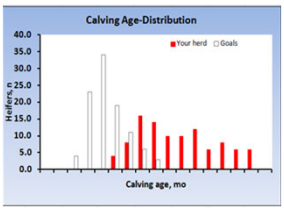
Each day calving is delayed beyond 24 months of age costs $1.50 to $3.00 per heifer

Source: P. Fricke, UW-Madison Department of Dairy Science

Extension UNIVERSITY OF WISCONSIN-MADISON

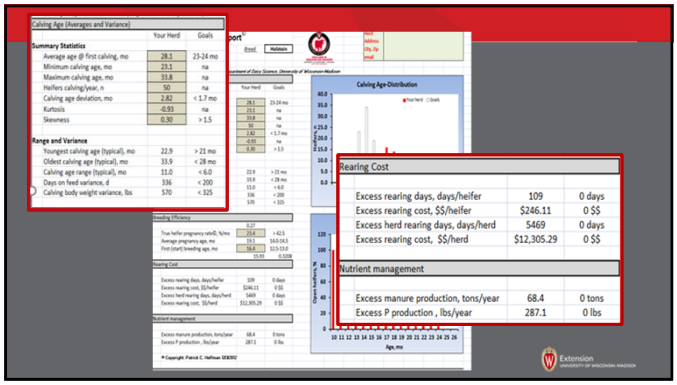
9

Are you managing the average or the range?



Extension
UNIVERSITY OF WISCONSIN-MADISON

10



11

Heifer reproduction goal

Raise heifers to reach a desired age and body weight early so they initiate puberty, establish pregnancy, and calve easily at a minimal cost

Extension
UNIVERSITY OF WISCONSIN-MADISON

12

Cows versus heifers

	Cows	Heifers
Estrous duration	7.3 ± 7.2 hours	11.3 ± 6.9 hours
Conception rate	<50	>50
Pregnancy loss	High	Low
Multiple ovulation	14%	5%
Twinning rate	8%	-1%

Source: P. Fricke, UW-Madison Department of Dairy Science

Extension UNIVERSITY OF WISCONSIN-MADISON

13

Understanding heifer reproductive cycle

- Onset of puberty is based on weight
- Heifers should be bred by size not age
- Heat detection
- Timing

Extension UNIVERSITY OF WISCONSIN-MADISON

14

How do we get there?

Parameter	Recommendation
Age at 1st heat	5 to 6 months
Weight at 1st heat	500 to 600 pounds
Age at 1st breeding	13 to 15 months
Weight at 1st breeding	55% of mature body weight (750 to 800 pounds)
Service rate	80% of heifers serviced within 21 days of target breeding age and/or weight
Projected age at 1st calving	22 to 24 months
Projected weight at 1st calving	85% of mature body weight (1,350 to 1,400 pounds)

Extension UNIVERSITY OF WISCONSIN-MADISON

15

Management barriers to high fertility

- Optimal weight
- Heat detection
- Timing

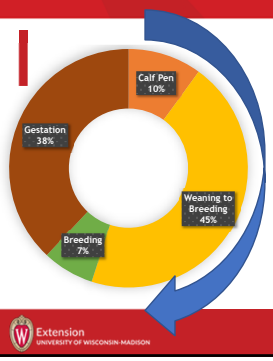
Extension
UNIVERSITY OF WISCONSIN-MADISON

16

Optimal weight

Extension

17



- Feed high plane of nutrition for the 13 months voluntary "waiting" or "weight" period
- Observe for puberty
- Plan for estrus
- First breeding at 14 months

Extension
UNIVERSITY OF WISCONSIN-MADISON

18

Pre-breeding phase (~300 Days)

Growth is biggest driver

Optimum weight gain 1.75 pounds per day
Range: 1.6-1.8 pounds per day

Source: Heinrichs et al. 2016

Extension UNIVERSITY OF WISCONSIN-MADISON

19

Keep them growing

Minimum daily nutrient requirements of Holstein heifers for 1.8 lbs average daily gain in a thermoneutral environment

Body weight (lb)	300	600	900	1,200
Dry matter intake (lb)	9.3	13.7	19.4	26.9
Crude protein (%)	16.9	15.0	14.2	13.3
Net energy (Mcal/lb)	1.11	1.10	1.08	1.02

Source: Hoffman, P.C., Raising Dairy Replacements

Extension UNIVERSITY OF WISCONSIN-MADISON

20

Heat detection

Extension UNIVERSITY OF WISCONSIN-MADISON

21

Primary signs of estrus

- Standing to be mounted

Extension UNIVERSITY OF WISCONSIN-MADISON

22

Secondary signs of estrus

- Mounting other heifers
- Mucus discharge
- Swelling, reddening of vulva
- Bellowing, restlessness, and trailing
- Rubbed tail head, dirty flanks
- Chin resting, and back rubbing
- Sniffing genitalia

Extension UNIVERSITY OF WISCONSIN-MADISON

23

Estrus detection aids

- Record keeping
- Signs of estrus
- Mounting detection aids
- Activity monitors

Extension UNIVERSITY OF WISCONSIN-MADISON

24

Timing

25

Timing is everything

Effect of time from first standing heat event to AI on conception rate

Time interval to AI (hours)	Conception rate (%)
0 – 16	68.7
16 – 20	59.7
> 20	47.1

Source: Adapted from Nebel et al., in DCRC Taking Heifer Reproduction to the Next Level

26

Heifer reproductive efficiency

Poor reproduction: SR=50%; CR=40%

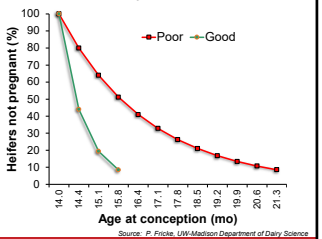
Average age:

- At 1st breeding: 14.0 months
- At conception: 16.4 months
- At 1st calving: 25.7 months

Good reproduction: SR=80%; CR=70%

Average age:

- At 1st breeding: 14.0 months
- At conception: 14.7 months
- At 1st calving: 24.0 months



Source: P. Fricke, UW-Madison Department of Dairy Science

27

Hormonal manipulation of ovarian function in heifers*

- Progestin
  - CIDR® Intravaginal Insert (Zoetis)
- Prostaglandin $F_{2\alpha}$
  - Lutylase® (Zoetis)
  - Estrumate® (Merck)
- Gonadotropin Release Hormone
  - Factrel® (Zoetis)
  - Fertagyl® (Merck)
  - Cystorelin® (Boehringer Ingelheim)

*FDA approved drugs for synchronizing estrous cycles in cows or heifers. Must be prescribed through a Veterinarian-Client-Patient Relationship (VCPR).

Extension UNIVERSITY OF WISCONSIN-MADISON

28

The hormones of the estrous cycle

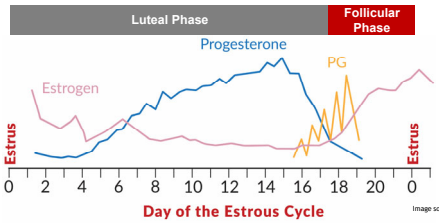
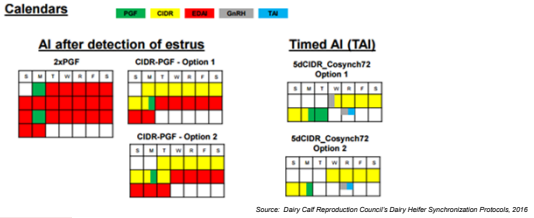


Image source: Adapted from Paul Fricke

Extension UNIVERSITY OF WISCONSIN-MADISON

29

Targeted breeding approach



Source: Dairy Calf Reproduction Council's Dairy Heifer Synchronization Protocols, 2016

Extension UNIVERSITY OF WISCONSIN-MADISON

30

Heifer reproduction goal

Raise heifers to reach a desired age and body weight early so they initiate puberty, establish pregnancy, and calve easily at a minimal cost

Extension UNIVERSITY OF WISCONSIN-MADISON

31

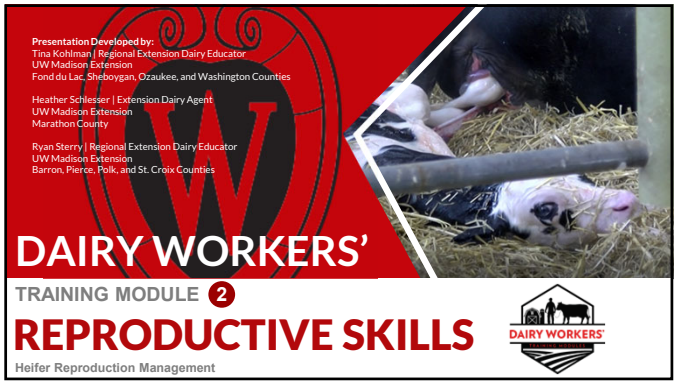
Targeted breeding approach

- Reach 55% of mature body weight the first 13 months
- Rebreed 1st group by 14 months of age
- Breed 100% of heifers for first time by 15 months

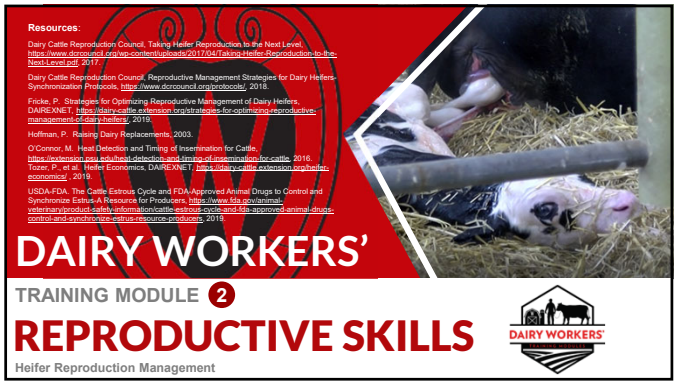
Extension UNIVERSITY OF WISCONSIN-MADISON

32

33


Presentation Developed by:
Tina Kohlman | Regional Extension Dairy Educator
UW Madison Extension
Fond du Lac, Sheboygan, Ozaukee, and Washington Counties
Heather Schiesser | Extension Dairy Agent
UW Madison Extension
Marathon County
Ryan Sterry | Regional Extension Dairy Educator
UW Madison Extension
Barron, Pierce, Polk, and St. Croix Counties
DAIRY WORKERS'
TRAINING MODULE 2
REPRODUCTIVE SKILLS
Heifer Reproduction Management
DAIRY WORKERS'

34


Resources:
Dairy Cattle Reproduction Council. Taking Heifer Reproduction to the Next Level. https://www.dcrcouncil.org/wp-content/uploads/2017/04/Taking-Heifer-Reproduction-to-the-Next-Level.pdf. 2017.
Dairy Cattle Reproduction Council. Reproductive Management Strategies for Dairy Heifers-Synchronization Protocols. https://www.dcrcouncil.org/protocols/. 2018.
Fricke, P. Strategies for Optimizing Reproductive Management of Dairy Heifers. DAIREXNET. https://dairy-cattle.extension.org/strategies-for-optimizing-reproductive-management-of-dairy-heifers/. 2019.
Hoffman, P. Raising Dairy Replacements, 2003.
O'Connor, M. Heat Detection and Timing of Insemination for Cattle. https://extension.psu.edu/heat-detection-and-timing-of-insemination-for-cattle. 2016.
Tozer, P., et al. Heifer Economics. DAIREXNET. https://dairy-cattle.extension.org/heifer-economics/. 2019.
USDA-FDA. The Cattle Estrous Cycle and FDA-Approved Animal Drugs to Control and Synchronize Estrus-A Resource for Producers. https://www.fda.gov/animal-veterinary/product-safety-information/cattle-estrous-cycle-and-fda-approved-animal-drugs-control-and-synchronize-estrus-resource-producers. 2019.
DAIRY WORKERS'
TRAINING MODULE 2
REPRODUCTIVE SKILLS
Heifer Reproduction Management
DAIRY WORKERS'

35


At University of Wisconsin-Madison Division of Extension, we are working to integrate accessibility into our web, video, and audio content. If you experience accessibility barriers using web, audio, or video content, or would like to request complete captions or other alternative formats, please contact accessibility@extension.wisc.edu. You will receive a response within three business days.
An EEO/AA employer, Extension provides equal opportunities in employment and programming, including Title VI, Title X, and the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act requirements.
DAIRY WORKERS'
TRAINING MODULE 2
REPRODUCTIVE SKILLS
Heifer Reproduction Management
DAIRY WORKERS'

36