

## Measuring and Improving Cow Comfort Across U.S. Regions

Katie Wood, Novus C.O.W.S. Project Manager

Description: Data and case studies from the Novus C.O.W.S. Program show how producers have been able to identify bottlenecks on their dairies and different ways they have made changes to improve cow comfort and farm production.

Constant demand for increased production and efficiency has dairies across the globe looking into identifying bottlenecks and new areas of opportunity. To help meet this demand, Novus International offers a value-added service program to their customers know as the Novus C.O.W.S.<sup>®</sup> Program. The program includes a comprehensive on-farm cow comfort assessment. To date, over 799 assessments have been completed on dairies in North America, by only a handful of assessors, ensuring accurate and consistent scoring.

Cow-based measures that are observed include lying behavior, leg injuries, and lameness and are documented for each dairy assessed. Across North America average daily lying times ranged from 7.0 to 13.5 h/d, and average prevalence of hock injuries, knee injuries, and lameness ranged from 0 to 100%, 0 to 53%, and 2 to 88% respectively. The data compiled created four regional free stall benchmarks; Canada, California, Midwest US, Northeast US and one open lot benchmark; Texas/New Mexico. During the report delivery process producers see how their data compares to data from other dairies in their regional benchmark.

Additionally, management and facility factors are recorded for the assessment pen. These measures are used in combination with the cow-based data to help identify potential bottlenecks on each dairy. Common areas that are identified as bottlenecks include, overcrowding at the stalls and feed bunk, high time away from the pen for milking, and hard stall surfaces or too little bedding.

After participating in a Novus C.O.W.S. assessment, many dairies are motivated by the farm specific data to create action plans. Goal setting and outside support have allowed farms to make both small and large changes and have a positive impact on cow comfort. Through re-assessments, producers can track how they have improved on their farm, as well as within the regional benchmark. Across the country, the Novus C.O.W.S. Program has documented several dairies that have made changes resulting in reduced lameness and injury prevalence and increased productivity. One dairy in particular reduced the time the cows were spending in the parlor by hiring another milker to speed up milking. After seeing a spike in milk production after this change, the producer then decided to switch to 3x milking, and saw a similar production response. This is a great example of a producer that used the Novus C.O.W.S. Program to help identify bottlenecks specific to his farm and made changes that resulted in improved cow comfort and efficiency.

**Measuring and Improving Cow Comfort Across U.S. Regions**

Katie Wood  
Novus C.O.W.S.®  
Project Manager

Pacific Northwest Nutrition Conference

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**Overview**

- Overview of the Novus C.O.W.S. Program
- Benchmark data from across the country
- Novus Published Data
- Case studies

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**Novus C.O.W.S. Program**

Comprehensive on-farm assessment program offered to Novus customers aimed at:

- Identifying and unlocking bottlenecks
- Optimizing cow comfort and well-being
- Improving productive efficiency
- Contributing to sustainability

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## Novus C.O.W.S. Assessments

- Focus on 1 pen for each farm (usually the high-producing, mature cows)
- Voluntary assessment (not an audit)
- Information is kept confidential between Novus, the producer, and their nutrition consultant



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## The Novus C.O.W.S. Program



- Started as a Master's project at the University of British Columbia (UBC), Canada in 2008
- Novus partnered with UBC in 2010
- Novus Program, 2011



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## The Novus C.O.W.S. Team



Megan  
Mouw, CA



Katie Wood, NY



Clemence  
Nash,  
Canada



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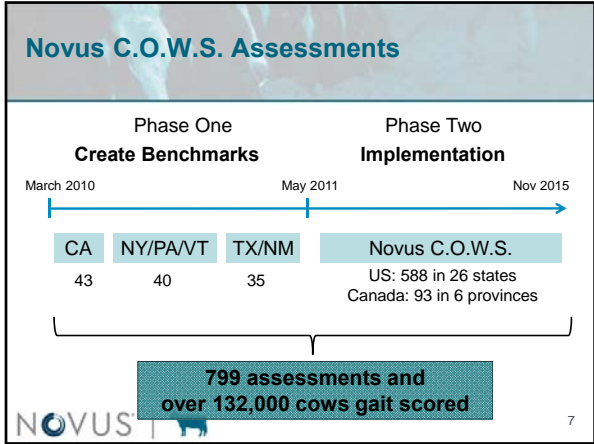
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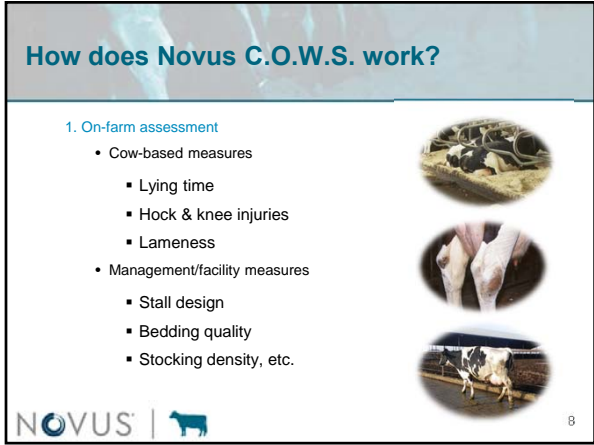
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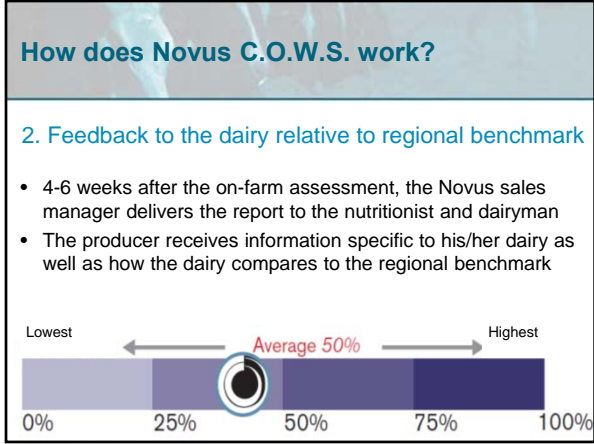
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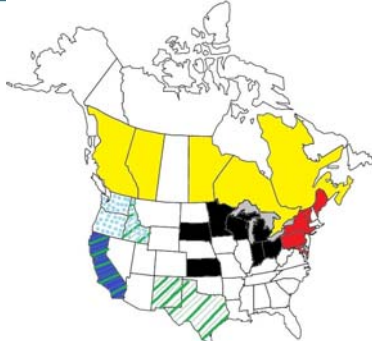
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## Novus C.O.W.S. Benchmarks



- **California**
  - 61 freestall dairies
- **Openlots**
  - 48 openlot dairies
- **Northeast**
  - 199 freestall dairies
- **Midwest**
  - 64 freestall dairies
- **Canada**
  - 44 freestall dairies
- **Pacific Northwest**
  - 17 freestall dairies




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## How does Novus measure lying time?

Data loggers recorded lying times of 40 cows (randomly selected from assessment pen)

- At 1-min intervals
- Averaged over 3 days



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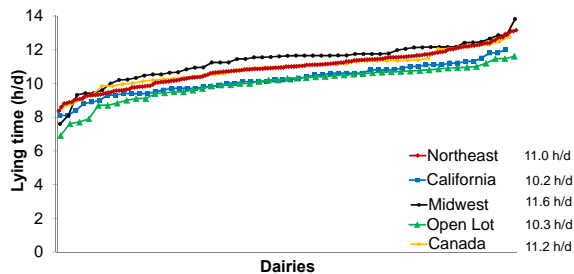
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## Lying Time by Region



(von Keyserlingk et al., 2012; Novus C.O.W.S. data)

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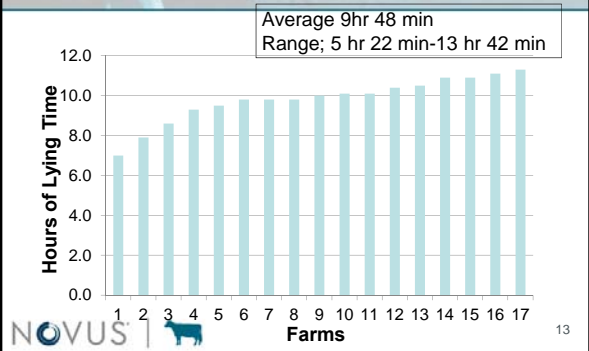
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### Lying Time in the Pacific Northwest




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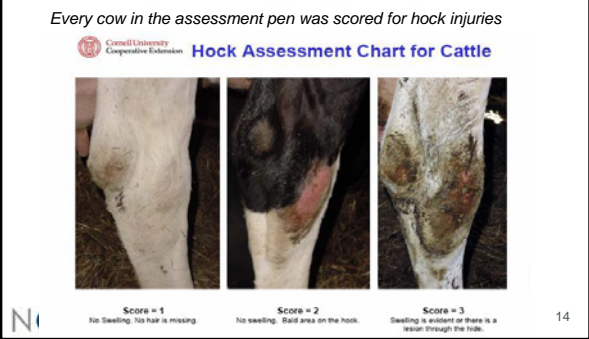
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### How does Novus score hocks?




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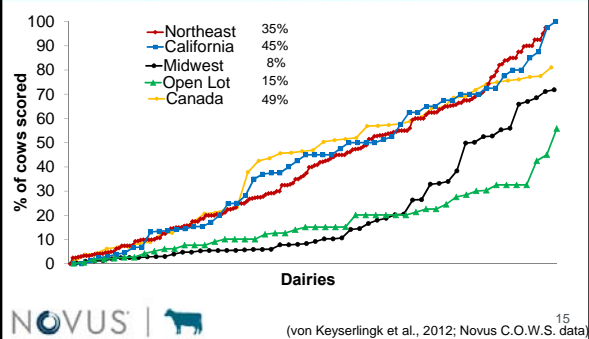
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### Overall Hock Injury Prevalence by Region




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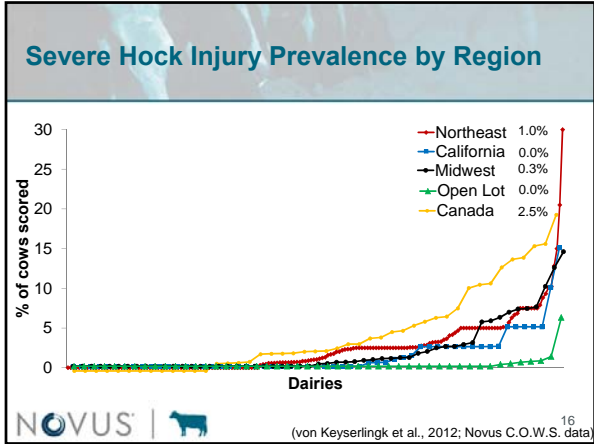
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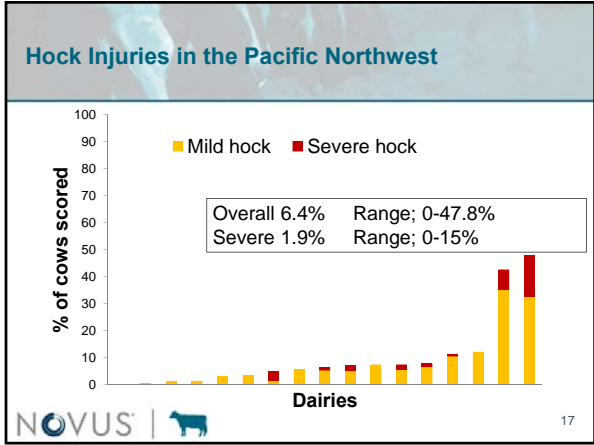
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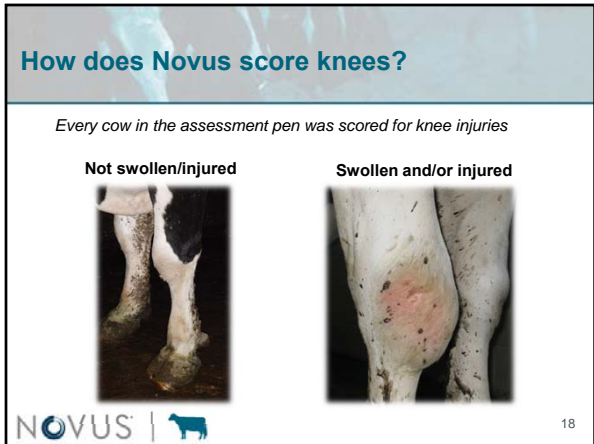
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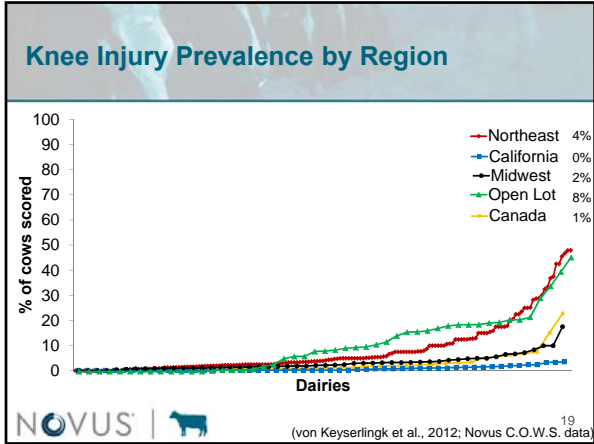
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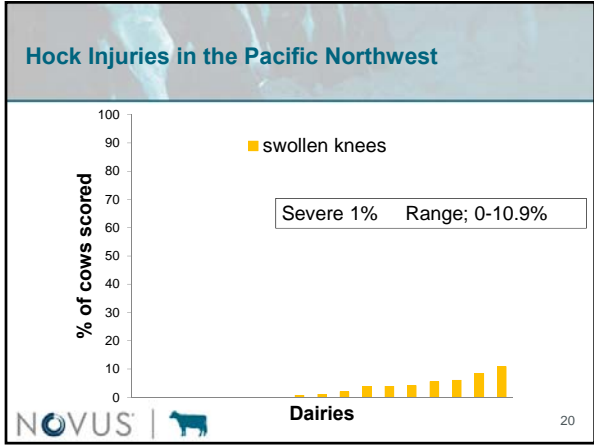
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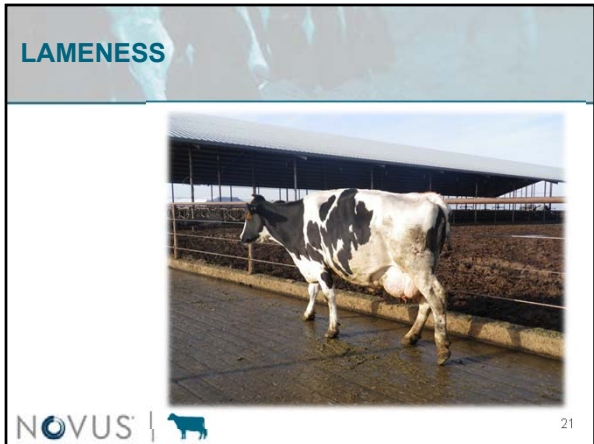
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## Lameness is a costly problem

- **Reduced fertility** (Bicalho et al., 2007)
  - 15% for mildly lame cows
  - 24% for severely lame cows
- **Increased risk of culling** (Bicalho et al., 2007)
  - + 45% for mildly lame cows
  - + 74% for severely lame cows
- **Reduced milk yield** (Green et al., 2002; Bicalho et al., 2008)
  - 800 to 900 lb over lactation
- **Welfare implications** (Whay et al., 2003)




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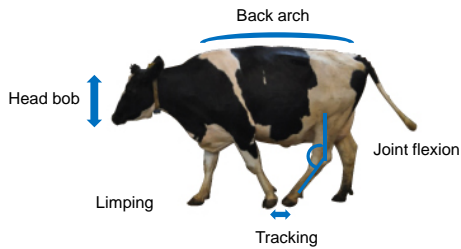
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## How does Novus score lameness?

Every cow in the assessment pen was scored for lameness




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## How does Novus score lameness?

Gait Score	Category	Description
1 (Sound)	Not lame	walks with a smooth and fluid locomotion, a flat back and even steps.
2 (Imperfect gait)		walks with a slightly uneven gait and slight joint stiffness but with <u>no limp</u> .
3 (Mildly lame)	Mildly lame	walks with shortened strides, an arched back and a slight <u>limp</u> .
4 (Moderately lame)	Severely lame	walks with an obvious limp, an arched back and a jerky head bob.
5 (Severely lame)		Unwilling to bear weight on one limb and/or must be vigorously encouraged to stand or move.

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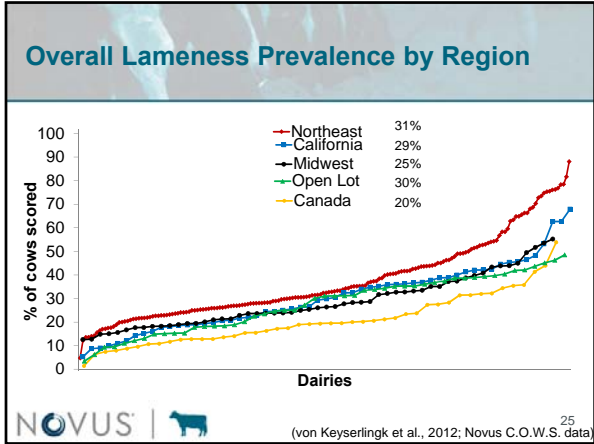
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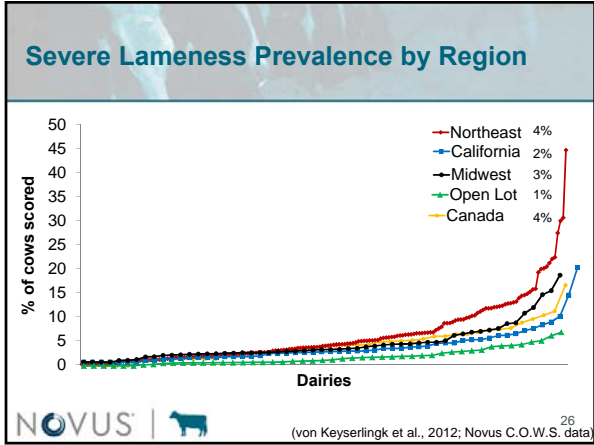
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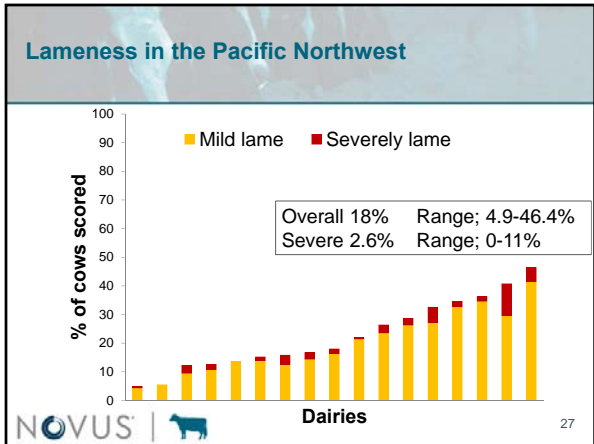
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## Factors that affect cow comfort *Published C.O.W.S. data*

1. Barrientos et al., 2013. **Herd-level risk factors for hock injuries in freestall-housed dairy cows in the northeastern United States and California.** JDS. 96:3758-3765
2. Chapinal et al., 2013. Herd-level risk factors for lameness in freestall farms in the northeastern United States and California. JDS. 96:318-328.
3. Ito et al., 2014. Associations between herd-level factors and lying behavior of freestall-housed dairy cows. JDS. 97:1-9.



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## 1. Overall Hock Injuries - Northeast



- **Deep-bedding**
  - deep-bedded stalls associated with fewer hock injuries



<sup>29</sup>  
(Barrientos et al., 2013)

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## 1. Severe Hock Injuries - Northeast



- **Deep-bedding**
  - deep-bedded stalls associated with fewer severe hock injuries
- **Automatic alley scrapers**
  - automatic alley scrapers associated with more severe hock injuries



<sup>30</sup>  
(Barrientos et al., 2013)

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## 1. Overall Hock Injuries - California



- **Stall stocking density (10% increase)**
  - higher stall stocking density associated with more hock injuries

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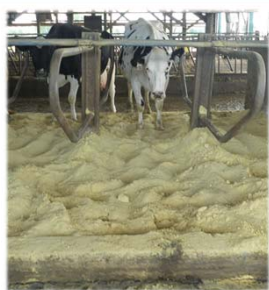
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## 1. Severe Hock Injuries - California



- **Bedding concavity (2.5cm decrease in bedding depth)**
  - decreased bedding depth associated with more severe hock injuries

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## Factors that affect cow comfort *Published C.O.W.S. data*

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## 2. Overall Lameness - Northeast



- **Herd size (100-cow increase)**
  - larger herds associated with lower overall lameness

- **Deep-bedding**
  - deep-bedded stalls associated with lower overall lameness



- **Access to pasture**
  - access to pasture associated with lower overall lameness

34  
(Chapinal et al., 2013)

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## 2. Severe Lameness - Northeast



- **Deep-bedding**
  - deep-bedded stalls associated with lower severe lameness

- **Herd size (100-cow increase)**
  - larger herds associated with lower severe lameness



35  
(Chapinal et al., 2013)

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## 2. Overall Lameness - California



- **Herd size (100-cow increase)**
  - larger herds associated with lower overall lameness

- **% of stalls with fecal contamination (10% increase)**
  - more contaminated stalls associated with higher overall lameness



- **Rubber in alley to parlor**
  - rubber in alley to parlor associated with lower overall lameness

36  
(Chapinal et al., 2013)

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## 2. Severe Lameness - California



- **% of stalls with fecal contamination (10% increase)**
  - more contaminated stalls associated with higher severe lameness
- **Frequency of manure removal from pen alleys (1-unit increase)**
  - more frequent manure removal associated with lower severe lameness



37  
(Chapinal et al., 2013)

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## Factors that affect cow comfort *Published C.O.W.S. data*

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## 3. Lying Behavior - Northeast



- **Deep-bedding**
  - deep-bedded stalls associated with:
    - higher lying time
    - fewer and longer lying bouts
- **Days in Milk (DIM)**
  - higher average DIM associated with higher lying time



39  
(Ito et al., 2014)

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### 3. Lying Behavior - California



- **% of stalls with fecal contamination**
  - More contaminated/dirty stalls associated with fewer and longer lying bouts
- **Days in Milk (DIM)**
  - higher average DIM associated with higher lying time



40  
(Ito et al., 2014)

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### Identifying Bottlenecks and Making Changes

- Identifying and unlocking bottlenecks to performance is different on each farm
- Even small changes to management or facility measures can have a large impact on cow comfort and productivity
- Improvements have been seen in:
  - Milk production and components
  - Lying time, lameness, and leg injuries
  - Reproduction
  - Culling rates
  - Feed efficiency



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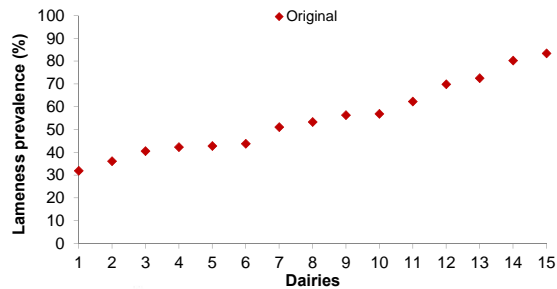
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### Novus C.O.W.S. herds that made changes showed improvements in lameness



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(Chapinal et al., 2014)

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### Nutritionist took different approaches to motivate change

- Benchmarked performance (production and reproduction) with other herds
- Toured 100 lbs farms that had good cow comfort
- Regularly (1/month) discussed why changes were necessary
- A new vet helped challenge the “good enough” mentality

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### Changes made

- Timed breeding program → preg rate increased from 13-14% to 17-18%
- Tweaked the diet → milk increased from 75 to 80 lbs/d
- Activity monitoring system → preg rate now in low 20's%

**This measureable progress helped motivate producers to improve more!**

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### Changes made

- Herd growth drove stocking density to 135-140%, so they built a new 4-row transition barn
- Touring good sand dairies in WI changed their minds on sand
- Realized existing lactating cow barn was no longer “good enough” and added on to the barn
  - Increased stall length
  - Switched to deep-bed sand

**Improvements in stall usage  
Making 90+ lbs  
26% preg rate**

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## Novus C.O.W.S. Case Study

Key success factors for implementing change:

- Attention to the right details and bottlenecks
- Bring in the right resources
- Team work and having the producer/management team on board



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## Novus Case Study: Change #1 Built a new transition facility



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## Novus Case Study: Change #1 Built a new transition facility



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### Novus Case Study: Change #1 Built a new transition facility

- Built 1 new mature cow pre-fresh pen to try “all in all out”
- ½ the mature cows stayed in old pen (new cows added weekly) and ½ were moved to the new “all in all out” pen
- **Cows in new pen had 2500 lbs greater ME milk**
- Built 3 more pens (lower stocking density, better cow comfort, better ventilation)

Milk ↑  
Metabolic disorders ↓ about 80%



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### Novus Case Study: Change #2 Moving water in pre-fresh heifer pen

Challenge: couldn't re-build old heifer pre-fresh pen

- 1 small water (2 ft) in corner of pack far from feed bunk
  - Heifers had to walk across the pack to get water
  - Water would make pack wet/messy

Solution: Replaced with a bigger trough (6 ft) and placed it at 1 end of the feed bunk

Daily DMI increased almost 8%  
(from 26 to 28 lbs/d) in 3 days!



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### Novus Case Study: Change #3

Challenge: milkers were paid hourly and milking slowly

Solution: milk for same amount of hours, but milk more cows

→ In Feb 2012, they went from 2x to 3x milking

Date	Milk (lb/d)	Fat	Protein
Oct 2011	67	3.5%	3.2%
Mar 2012	79	3.8%	3.3%
Nov 2013	86	3.9%	3.1%
Spring 2015	90		

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## Novus C.O.W.S. Case Study

Key factors driving change and success:

- Strong relationship with nutritionist
  - “our nutritionist was the biggest success factor through the changes”
- Have quarterly team meetings with nutritionist, producer and management team, and outside resources
  - Outline action items
  - Discuss progress on action items from last meeting
  - Look at finances (ie: how profitable will we be with the drop in milk prices? What can we do to stay successful?)



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## Novus C.O.W.S. Case Study

- 600 milking cows
- Novus C.O.W.S. assessment: Oct 2012
- Report delivery: Dec 2012
- Results
  - wanted increased parlor through-put
  - wanted lower TAFP (time away from pen for milking)
    - Pen 1: 175 cows, 4:52 h/d
    - Pen 3: 200 cows, 5:12 h/d



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## Novus C.O.W.S. Case Study *Changes Implemented*

- Before making change, one owner helped pushed cows to see if parlor through-put and TAFP would improve
- Changes made early March 2013:
  - Went from 1 full milker and 1 milker/pusher to 2 full milkers and 1 separate pusher
- Total herd milk time per shift was reduced by 2.5 hrs (7½ hrs down to 5 hrs)



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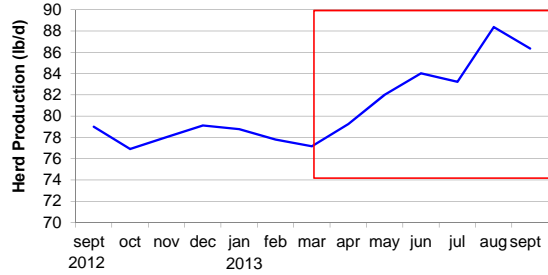
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### Novus C.O.W.S. Case Study Changes in parlor efficiency results




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### Novus C.O.W.S. Case Study

- The following year cows were up in production so much and parlor through-put was low enough that the dairy made the decision to go 3x
- "cows were telling us they needed 3x milking by leaking between 2x milkings"
- Split pens in 1/2 for milking to keep TAFP low
- Can milk these smaller split pens in 45 mins each
- Switched to 3x on Feb 25, 2014




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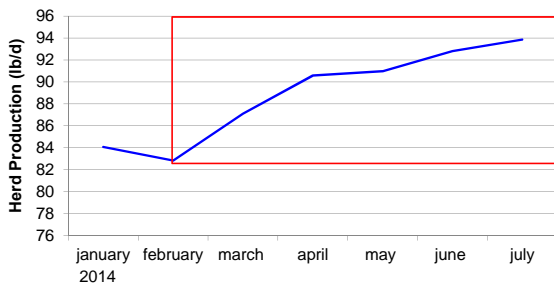
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### Novus C.O.W.S. Case Study Changes from 2x to 3x milking




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## Novus C.O.W.S. Case Study

- Assessed in July 2014 and March 2015
- Milking 500 cows, 3x
- Shallow bedded sand
  - Mattress a few inches down in stall with sand on top
- Changes made to bedding management

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## Bedding Management

Measurement	July 2014	March 2015
Bedding Frequency # Days	3.5 d	3.5 d
Bedding Quantity Inches Below Curb	3.6 in	2.2 in
Bedding Maintenance # Raked/Day	3	3
Bedding Cleanliness 1=Clean, 3=Dirty	1.2	1.4
Bedding DM%	98%	98%

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## Lying Time

Date	Lying Time Avg. Hrs/Day	Minimum	Maximum
July 2014	12.1	3.8	15.8
March 2015	13.4	10.6	17.0

Date	Lying Bouts Avg. Bouts/Day	Minimum	Maximum
July 2014	9.3	3.0	14.0
March 2015	10.6	6.3	15.7

Date	Bout Length Avg. Mins/Day	Minimum	Maximum
July 2014	82.1	52.7	156.8
March 2015	81.7	46.7	168.5

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## Lameness and Injuries

	July 2014	March 2015
Lameness	25.8%	24.7%
Severe Lameness	1.1%	0%
Hock Injuries	20.2%	21.5%
Severe Hock Injuries	10.1%	0%
Knee Injuries	4.5%	2.2%

Went up 4 lbs in milk



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## Take Home Messages

- Novus C.O.W.S. Program is providing valuable feedback to producers on cow comfort on their farm relative to regional benchmarks
- In each region, there are dairies with cow comfort issues and dairies that have good cow comfort
- Cow comfort bottlenecks and solutions are multi-factorial
- Even small/low-cost changes can help producers improve cow comfort and find lost milk



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## Thank you

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