ODV MEETING
2013

EVALUATING ISSUES ON MODERN DAIRIES; LAMENESS AND WELLNESS ASSESSMENT
Observations on the design and use of footbaths for the control of infectious hoof disease in dairy cattle

Nigel B. Cook a,⇑, J. Riemann a, A. Gomez a, K. Burgi b

Food Animal Production Medicine Group, Department of Medical Sciences, University of Wisconsin–Madison, School of Veterinary Medicine, Madison, WI 53706, USA
Dairyland Hoof Care Institute Inc., Baraboo, WI 53913, USA

A B S T R A C T

A survey of 65 freestall-housed dairy herds in five different countries, with an average of 1023 milking cows, found that footbaths were used 1–4 times per day for 1–7 days per week, with between 80 and 3000 cows passing through the bath between chemical changes. The most common agents used were copper sulfate (41/65) and formalin (22/65). Twenty-seven herds (42%) used more than one chemical. The median footbath measured 2.03 m long by 0.81 m wide, and was filled to a depth of 0.11 m with a volume of 189 L (range 80–1417 L).

An observational behavioral study was conducted using a custom-designed footbath to test four different bath dimensions, with two different step-in heights. The number of immersions per rear foot was counted for each footbath design for each cow passing through the bath on two consecutive days. While a higher step-in height significantly increased the number of foot immersions, the effect was small compared to the effect of length. The probability of each rear foot receiving at least two immersions reached 95% at a bath length of 3.0 m, and a significant increase in the frequency of three and four immersions per foot was observed between 3.0 and 3.7 m. In order to optimize the number of foot immersions per cow pass, while limiting the footbath volume, this study recommends a bath 3.0–3.7 m long, 0.5–0.6 m wide, with a 28 cm step-in height.

Introduction

Infectious causes of lameness in dairy cattle remain common world-wide in intensively managed systems (Blowey, 2005). Heel horn erosion (slurry heel), (papillomatous) digital dermatitis (Mortellaro's disease, heel warts) and interdigital necrobacillosis (foul-in-the-foot, footrot) commonly affect cattle maintained in environments where foot hygiene is poor, creating low oxygen tension, and a constant moist environment on the epidermis of the skin adjacent to the claw horn, which is ideal for infection and disease (Berry, 2001).

In freestall (cubicle) housed dairy herds, use of a footbath with a variety of different antibacterial agents is commonplace and the centerpiece of many on-farm approaches to the control of infectious hoof disease. Given the high prevalence of lameness in the dairy industry and the significant contribution to the overall problem through diseases such as digital dermatitis (Blowey, 2005), it is surprising to find that so little research has been invested in the operation of footbaths. The studies that have been performed have generally focused on the efficacy of different antibacterials, such as copper sulfate, zinc sulfate, formalin and antibiotics such as oxytetracycline, erythromycin and lincomycin (see review by Laven and Logue (2006)).

Of note in the product testing used in completion of footbath research, are the wide variation in methodologies between studies and farms. For example, the duration of the studies has ranged from 1 week to 6 months (Laven and Hunt, 2002; Manske et al., 2002), and the frequency of use has ranged from 1 to 5 days per week (Holzhauer et al., 2008; Döpfer et al., in press). Some studies have examined the efficacy of the footbath for treatment of cows with existing infections (see, for example, Laven and Hunt, 2002), rather than the prevention of infection in the entire group (e.g. Thomsen et al., 2008; Speijers et al., 2010; Teixeira et al., 2010). Two reports used a split bath and within-cow control (Manske et al., 2002; Thomsen et al., 2008), while others used a single bath and separate treatment and control groups of cows (Holzhauer et al., 2008; Speijers et al., 2010; Teixeira et al., 2010; Döpfer et al., in press). There is an obvious need to standardize footbath-testing methodology to provide comparable results across studies, and the design and frequency of use of the footbath should be included in that standardization.

The efficacy of a topical antibacterial agent against infectious hoof disease is likely to be influenced by the transfer of the chemical to the foot, and its contact time with the adjacent skin. This

⇑ Corresponding author. Tel.: +1 608 265 4981.
E-mail address: nbcook@wisc.edu (N.B. Cook).

http://dx.doi.org/10.1016/j.tvjl.2012.06.051
will be largely determined by the design and layout of the footbath. Substantial differences in bath design exist between reported studies. For example, footbath length ranges between 1.5 m and 3.0 m across studies (e.g. Holzhauer et al., 2008; Teixeira et al., 2010). The impact of different footbath designs on the delivery of antibacterial chemicals to the feet as the cow passes through the bath needs to be explored.

The objectives of this study were, firstly, to measure and summarize the design and use of footbaths in order to examine the current scope of variation in freestall-housed dairy herds. Secondly, using the number of foot immersions received per cow pass as a primary outcome to optimize design of the footbath, we performed an observational behavioral study to determine the effect of different bath dimensions on delivery of chemical to the cow’s feet.

Material and methods

A survey of different footbath designs and practices of freestall housed dairy herds was performed using First Step software (Zinpro) and the technical field staff of Zinpro. First Step is a database program designed to capture and summarize risk factors for lameness in dairy herds based on 20 different risk assessors. The footbath assessor is used to summarize current footbath design and management on farms visited by field staff as part of their value added services to their nutrition clients worldwide. The clients selected had expressed an interest in receiving the service and were therefore not a true random sampling of dairy herds. The First Step files were uploaded and summarized in Excel (Microsoft) with one entry per farm for a total of 65 farms. The data collected included the footbath dimensions, the number of cow passes between chemical changes, the types of antibacterial agent used and the frequency of footbath use.

An observational behavioral study was carried out on a 550-cow commercial freestall-housed dairy herd. A single pen of approximately 90 Holstein milking cows was chosen as the study group, and the owner requested to keep the group stable over the course of the trial, with no new additions to the pen. A custom-designed footbath was set up in a transfer lane to test the hypothesis that the design and dimensions of the bath influence the number of immersions the rear feet receive as the cows pass through the bath. The custom bath allowed for the testing of four different bath dimensions, the types of antibacterial agent used and the number of foot immersions received per cow pass as a primary outcome to optimize design of the footbath, we performed an observational behavioral study to determine the effect of different bath dimensions on delivery of chemical to the cow’s feet.

All data were summarized in Excel (Microsoft) and statistical analyses were performed in SAS (version 9.2; SAS Institute). The influence of footbath dimensions on the frequency of foot immersions was examined using the GLIMMIX procedure of SAS, with cow limb as a random term, with both footbath length and step-in height included as fixed effects to determine the probability of cows receiving at least two immersions per rear foot. A proportional logistic (ordinal) model was created using the LOGISTIC procedure of SAS for foot immersion data confined to the 28 cm step-in height and the four different bath lengths (1.8, 2.4, 3.0 and 3.7 m) considering one, two, three and four or more foot immersions as the model outcome.

Results

The 65 freestall housed dairy herds surveyed averaged 1023 milking cows in size with a range from 100 to 4100 cows. The herds originated from five different countries (US, Spain, Japan, UK and New Zealand) and within the US, 12 different States were represented. A wide variety of antibacterials were used in the footbath, with 42% of herds using more than one agent in rotation. Copper sulfate was the most commonly used antibacterial, with 63% of herds using it at concentrations of between 1% and 10%, often in combination with an acidifying agent. Formalin was also common, used by 34% of surveyed herds at between 2% and 5% concentration. A proprietary liquid zinc chloride solution (Hoof-Zink: Garco) was used by 9% of herds. Antibiotics, including lincomycin and oxytetracycline, were used by only 5% of herds, and then only in the case of an outbreak of digital dermatitis.

Table 1 summarizes the footbath design and management survey data obtained. The median footbath measured 0.81 m wide, was 2.03 m long and was filled to a depth of 11 cm. Median capacity was 189 L, with a wide range from 80 to 1417 L. The median frequency of footbath use on the surveyed farms was one a day, with a range from one to four times daily, and 3 days per week with a range from 1 to 7 days. Median cow passes between chemical changes was 250, with a wide range from 80 to 3000 cow passes.

The mean (SD) number of rear foot immersions in footbaths of different dimensions is summarized in Fig. 1 for the observational behavioral study. As the footbath length increased, the number of immersions per rear foot also increased. At the shortest footbath length of 1.8 m, 51% (SD 4.7%) of rear feet received only one immersion and 46% (SD 1.6%) received two immersions per cow pass. The frequency of foot immersions was significantly influenced by both footbath length (P < 0.0001) and step-in height (P < 0.0001). However, the size of the effect of step-in height was relatively small compared to the impact of length (F statistic 13.1 compared to 102.2 respectively). The higher step-in height allowed for improved retention of the bath solution and was tolerated well by the cows, therefore, the 28 cm step-in was the only version tested for the two longest bath lengths.

The probability for each rear foot receiving at least two immersions is shown in Fig. 2. Greater than 95% probability of at least two immersions per rear foot was not achieved until the bath measured at least 3.0 m in length. A significantly greater number of foot immersions were observed in the 3.7 m bath compared to the 3.0 m bath, with a significant transition from 30% (SD 0.44%) to 56% (SD 1.6%) of feet receiving three immersions, and an increase in the number of feet with four or more immersions (P < 0.05).

Discussion

Although small in scale, this study highlights the variability in footbath design and management observed in freestall housed dairy herds world-wide, and given the paucity of scientific information related to footbath programs it is unsurprising. The survey herds were a select population requesting services from Zinpro Corporation, and the mean herd size of 1023 cows suggests that they represented larger more progressive production units.
Despite the general understanding that footbaths are extremely important in the control of infectious hoof disease (Blowey, 2005), guidance on their operation remains largely empirical. Copper sulfate and formalin dominate the agents used as antibacterials in footbaths despite the wide variety of options available, suggesting that producers believe that these agents remain cost effective and efficacious. This view is supported by recent research (Holzhauer et al., 2008; Speijers et al., 2010; Teixeira et al., 2010; Döpfer et al., in press), where 4% formalin and copper sulfate at concentrations of 2–5% were reported to provide effective control. Given the concerns regarding the use of antibiotics in production agriculture, it is comforting to see that at least in this small sub-set of herds, extra-label use in footbaths was uncommon, and limited to secondary use in the event of an outbreak of digital dermatitis.

Despite the general advice that footbaths should be used regularly to be effective (Blowey, 2005), there was a wide range of times per day and days per week of use. With problems associated with disposal of the chemicals used, perhaps the best advice for any given herd is to use the footbath as little as possible to maintain effective control over the incidence of infectious causes of lameness. In the surveyed herds, the median herd used a footbath once a day for three days a week, which is more frequent than many of the published studies that report efficacy at a frequency of 1–2 days per week (Holzhauer et al., 2008; Speijers et al., 2010; Teixeira et al., 2010). More work is required to optimize prevention strategies at least cost, limiting antibacterial use to the minimum required to obtain effective control.

The number of cow passes between solution changes varied widely between 80 and 3000 cows, with a median of 250 cows. Empirical advice for changing footbath solutions every 100–300 cows appears to be followed by the majority of farms, but is challenged on larger dairies, where this recommendation would require chemical changes for every pen of cows milked. Clearly there is a need for scientifically sound advice on when it is necessary to replenish the solution. Activity and effectiveness varies with the different antibacterial agent used, the time and tempera-
ture that they are used at, and the degree of manure contamination and the susceptibility of the agent to fecal deactivation. Until that information is available, producers should titrate the number of cow passes against the pen prevalence of reported infectious hoof disease to achieve least cost prevention. If the last pen of cows through the bath has a significantly greater prevalence of infection than the rest of the herd, then the number of cow passes between solution changes should be reduced.

A wide range of footbath dimensions was recorded in the surveyed herds. Notably, the length of the footbaths ranged from 1.6 to 4.6 m, width ranged from 0.3 to 3.5 m, and the volume of the baths varied almost 18 fold, ranging from 80 to 1417 L. Given the cost of the antibacterial agents used, there was a clear tendency to use smaller volume baths in the majority of herds, with the median volume of 189 L. However, short baths influence the number of steps taken through the bath and small volumes of bath solution may become rapidly contaminated with manure – both from defecation and from contaminated legs and feet.

Our observational study of cow behavior and use of water-filled footbaths of different dimensions demonstrates the impact on the number of immersions of the rear feet as the cows pass through the bath. The study design and analysis was compromised by an inability to accurately record individual animal identification, precluding the ability to account for individual cow variation from day to day and bath to bath. The camera angle required to observe the cows’ feet accurately did not allow for identification of the cows. The fact that the footbath dimensions once changed, could not be changed back, also failed to provide for a switch-back design, which would have strengthened the conclusions. The fact that this is merely an observational study is also an acknowledged weakness, with a general, as yet unproven, assumption that an increase in foot immersions per cow pass will enhance the overall efficacy of the footbath. This hypothesis requires further testing in a controlled prospective study, but early clinical impressions are promising. However, although limited, the data were consistent between observation days for the same bath dimensions, and it is not unreasonable to approach footbath design from the perspective that optimizing foot immersions for baths at a given volume would lead to equal or better efficacy of the antibacterial agent used.

In order to achieve at least two immersions per rear foot with a probability >95%, the footbath needs to be at least 3.0 m in length. A higher step-in height of 28 cm compared to 15 cm significantly increased the number of feet receiving more than one immersion, but the difference was small compared to the effect of increased length. Regardless, the higher step-in was tolerated well by the cows and it served to retain more solution at the end of bath use. A significantly greater number of foot immersions were observed in the 3.7 m bath compared to the 3.0 m bath, and this small increase in length may be worthwhile to receive the potential benefit of three or more foot immersions. The narrower bath dimensions were well tolerated to 0.5 m, with few cows stumbling. However, it was noticeable that passage through the bath for cows with the largest udders was easier at 0.6 m.

Conclusions

The design and management of footbaths for the prevention of infectious hoof disease varies widely between herds. While copper sulfate and formalin continue to be commonly used, there is a need for improved recommendations for footbath design and operation to maximize antibacterial effectiveness at least cost. In order to optimize foot immersions per cow pass, while limiting footbath volume to ~190–200 L, we recommend a single bath 3.0–3.7 m long, 0.5–0.6 m wide, with sloped side walls, with a step-in height of 28 cm (Fig. 3). This design will ensure that rear feet receive at least two immersions per cow pass with 95% probability.

Conflict of interest statement

N.B. Cook co-developed the First Step program with Zinpro and has spoken at meetings around the world on lameness prevention. None of the other authors has a financial or personal relationship with any people or organisations that could inappropriately influence or bias the content of the paper.

Acknowledgements

The authors would like to thank Mike Socha and Zinpro for assistance in the collection of the survey data using First Step. Jane Rieman was supported by a USDA Animal Health Grant. We would also like to thank the dairy producers for the time and willingness to assist in the study. Preliminary results were presented as an ab-
Abstract at the 16th Symposium and 8th Conference Lameness in Ruminants: Lameness – A Global Perspective, Rotorua, New Zealand.

References


Holmes County Hardware

plus a little technology

By Dr. Eric Shaver
Detorsion Rod Retrofit

- Standard Rod:
  - 2 rings at the end of a straight rod

Ellis Uterine Detorsion Rod
available from Veterinary Concepts
W111 Central St.
Spring Valley WI 54767
www.veterinaryconcepts.com
Holmes County Retrofit

- Local machine shop fabrication
- Welded stainless steel plate to standard detorsion rod.
- Plate had notches ground into edge to allow quick attachment of chains and to prevent slippage.
Breech Bar

- Handy device commercially available through Veterinary Concepts.
- Local machine shop able to reproduce at a fraction of the cost.
Sphincter Dilator

- Another handy device commercially available through Veterinary Concepts.
- Has virtually replaced teat slitters, Huggs tumor extractors, and Lichty teat knives in our practice.
- Easy to sterilize and does not destroy sphincter tissue.
- Have not had a reproduction made, but machine shop is confident they could reproduce this.
Bootleg Reimer Emasculator

- Reimer emasculator available through JorVet for $470.00. These were found on E-bay in abundance under a general emasculator search for $20.00 each.
- Our experience so far is that they crush quite well, but their cutting ability is poor, hence we use the scalpel already in use to incise the scrotum.
Tail Jack

- Handy device made at a local harness shop.
- Useful when there is not an extra pair of hands around.
- Pattern is from an old-time vet that graduated in the 1930’s and practiced in Holmes County for over 50 years.
Tail Jack in Use
Wyoming Beef Halter

• Simple, cheap halter consisting of a ring with 10—16’ rope.
• Adaptable to many species
• Can also be used as leg ropes for roll and tacks and for restraint.
• Easy on/Easy off
• Locally made at harness shop
Applying a Wyoming Beef Halter

1. Ring around the neck
2. Loop through the ring
3. Loop over the nose
4. Adjust to fit
Personal Protective Devices

• Leg protection made from catchers gear with upper and lower shields removed.
• Easily slips into LaCrosse boot top
More Personal Protection Devices

- Football helmet protection during bovine/equine semen collection and trich testing.
- Metal face cage adds double protection for face.
DVM Rapid Test

• Portable analyzer for turbidimetric assays
• 3 common methods for IgG evaluation:
  ▪ refractometer measurement of TP
  ▪ ZnSO4 turbidity test
  ▪ commercial IgG concentration

• A fourth method
  The DVM Rapid test uses spectrophotometry to measure insoluble immune complexes formed between IgG antigens of the species in question with goat anti-species IgG.
Capabilities

• Bovine IgG on serum/plasma
• Camelid IgG on serum/plasma
• Equine IgG on serum/plasma
• Bovine Colostrum IgG
• Equine Colostrum IgG
• Bovine Sperm Count
• Equine Sperm Count
• Porcine Sperm Count
Serum/Plasma IgG Turbidimetric Immunoassay (TIA):

What you need to run a Test:

• Serum/Plasma IgG Kit
• 10ul micropipette and yellow micropipette tips
• Timer and Test Tube Rack
• DVM Rapid Test™ Portable Analyzer
• Patient Samples (Fresh Serum or Plasma)
• Operators Manual, Data Manual and product inserts
Step One: Set-up test tubes.

• 30 minutes prior to testing, remove the Red Capped Reagent Blank Tube and one Clear Capped Reagent Tube for each patient sample or Control to be tested and equilibrate to room temperature.

• Label each Reagent Tube, then remove and save the clear cap.
Step Two: Acquire Sample

- Using the white 10ul micropipette, place a yellow pipette tip on the micropipette.
- Push plunger down until it stops and place tip just below the surface of your serum or plasma sample and release plunger slowly.
- Remove tip from sample and touch to top inside of sample container to remove excess liquid from outside of tip. Check to make sure there are no air bubbles visible. If air bubbles are present, dispense sample back into the original container and try to resample. If problem persists, replace micropipette tip and reacquire sample.
Step Three: Add test sample(s) to reagent tube(s)

- Place tip just under the surface of the reagent in the tube and push plunger down then release plunger, repeat twice. With the plunger down withdraw the pipette and remove and discard the tip.
- Repeat for each Sample or Control.
Step Four: Recap and mix sample(s)

- Recap tube(s) with original clear caps and mix each reagent tube by inverting five times.
Step Five: Set timer for incubation of samples

• Set a timer for 10 minutes.
• Start timer to begin room temperature incubation.
Step Six: Performing Test Measurement(s)

- When the 10 minute incubation is complete: Turn on DVM Rapid Test™ by pressing the "ON/OFF" button once.
- Display will read "VALUE DIAGNOSTIC SYSTEM" followed by "MODEL 942 %T".
Step Six: Performing Test Measurement(s)

- At the Model 942 %T prompt, press the "ON/OFF" button again to activate auto blank function.
- Display will then read "AUTOBLANK ON %T" followed by "INSERT BLANK".
Step Six: Performing Test Measurement(s)

• Using a tissue or soft cloth, wipe the outside bottom of the Red capped Reagent Blank Tube then mix by inversion five times and insert into well.
• Display will then read "READING BLANK" followed by "REMOVE BLANK".
Step Six: Performing Test Measurement(s)

• At the prompt remove and return the Reagent Blank Tube to the test kit.
• (Note: DO NOT discard the Reagent Blank Tube until you have used all the tests for an individual kit.)
• Instrument is now ready to read samples.
• Display will then read "INSERT SAMPLE".
• One sample at a time, remix by inverting five times, wipe clean the outside bottom of the tube and insert tube into the well.
• Display will then read "READING SAMPLE" followed by "XX %T", where XX is your sample reading.
Step Seven: Converting %T to a numerical result

- Locate the appropriate %T Conversion Chart in your DVM Rapid Test™ Data Manual. (Use the chart specific for the Test and Species being tested)
- Find the %T value on the %T Conversion Chart
Quality Control

• Note:
Serum IgG Controls are provided with all IgG test kits. The IgG Control should be treated in the same manner as a test sample. Follow the test procedure used for unknowns. A range of acceptable concentrations is listed on the IgG Control data sheet included with each test kit. As long as the Control value falls between these values the sample values will be accurate, repeat testing if the Control value is found to be out of range.
Colostrum IgG Turbidimetric Immunoassay (TIA):

What you need to run a Test:
• Colostrum IgG Kit
• 5ul and 500ul micropipettes
• 200ul (yellow) and 1250ul (clear) micropipette tips
• Timer and Test Tube Rack
• DVM Rapid Test™ Portable Analyzer
• Colostrum Sample(s)
• Operators Manual, Data Manual and product inserts

Step One: Set-up
• Remove one Green capped Dilution Tube, one Clear capped Reagent Tube for each colostrum sample to be tested and the Red Capped Reagent Blank Tube.
Sperm Concentration Turbidimetric Assay (TA)

What you need to run a Test:

• Sperm Concentration Kit
• 25ul, 50ul and 1ml micropipettes
• 200ul (yellow) and 1250ul (clear) micropipette tips
• Timer and Test Tube Rack
• DVM Rapid Test™ Portable Analyzer
• Semen Sample(s)
• Operators Manual, Data Manual and product inserts
Test Costs

• DVM Rapid test Cost: $ 800.00

• Test kit cost varies by species and test type
  – serum/plasma Camelid IgG
    $120.00 per 12 test kit or $10.00 per test
  – serum/plasma Equine IgG
    $138.75 per 18 test kit or $7.65 per test

• Technician time to run test:
  – prep time: 5 mins
  – warm/incubation time: 40 mins
  – reading sample: <2mins
Record of Results

• We use a simple in house sticker system to record results, that we then attach to our in house laboratory routing sheets.

Bovine IgG:
Percent:____________
Serum/plasma IgG:_____________
Contact Information

VALUE DIAGNOSTICS
A Division of Immunosystems, Inc.
228 S. McKay Ave, P.O. Box 39, Spring Valley, WI 54767
Technical Support: 800-872-7741 or Fax 715-778-4402
Email: sales@valuediagnostics.com
Reproductive Audits for Dairy & Beef Herds

Gustavo M. Schuenemann

Dairy Extension veterinarian
Department of Veterinary Preventive Medicine
The Ohio State University
Transition Period: What, How, Why & When?

Dry Off & Late Gestation
- Lactation history
- TMR
- BCS
- Nutrition
- Vit & Minerals
- Health
- Immunizations
- Overcrowding
- Record-keeping
- Facilities/Design
- Dystocia
- Twins/Stillbirth
- BCS
- NS
- Sire
- Record-keeping
- Environment
- Protocols/Procedures
- Personnel Training
- DA/Ketosis
- NEB
- VWP
- Economics
- Diseases
- Diagnosis
- TMR

Calving
- Economics
- Feed Inventory/Delivery
- Vit & Minerals
- RP
- Metritis/Edometritis
- RP
- Compliance to Protocols
- People
- Data management
- AI tech
- Semen Delivery
- Environment
- Economics
- Genetics
- Diseases

Early lactation
- Economics
- Diseases
- Synch protocols

Breeding & Lactation
- Sire
- Fertility
- Genetics
- Diseases
- Environment
- Synch protocols
Pregnancy Rate in Dairy Herds

(DMRS 2010; 8,211 herds)

>73% of Variation in PR is Due to Management/Environment

(Schuenemann et al., 2012; ongoing study)

- Top 10%: ~26%
- Bottom 10%: ~8%
Cow Fertility – Multi Factorial

- Transition Cow
- Stillbirth
- Dystocia
- Metritis
- Mastitis
- Management
- Lameness
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Diseases
- Abortion
- Poor Cow Comfort
- AI Technique
- Facility Design
- Compliance to Protocols
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowding
- Semen Quality
- Synch Program
- Genetics
- RFM
- People
- Overcrowd
Effect of AI Technicians on Reproductive Performance and Economics of Lactating Dairy Cows

G.M. Schuenemann¹, S. Bas¹, and K.N. Galvão²,

¹Department of Veterinary Preventive Medicine, The Ohio State University, Columbus, ²Department of Large Animal Clinical Sciences, University of Florida, Gainesville
Motivation for the Study

- In dairy herds, it is common to observe large within-herd variation in IA technician CR

- Is there any way I can achieve consistent reproductive outcomes over time?

- How much is the economic difference among AI technicians?
Objective

To assess the effect of three AI technicians on reproductive performance and economics using an individual cow-based stochastic model for dairy herds
Hygiene Practices by AI Technicians

Hygiene Scores of AI Guns

A
*CR: 38%
(n = 3,970)

B
*CR: 32%
(n = 3,566)

C
*CR: 26%
(n = 3,557)

(*P<0.05)
Monthly Variation in CR by AI Technician

(Mean & Upper-Lower) (*P<0.05)
# Economics of Reproductive Performance by AI Technician

<table>
<thead>
<tr>
<th>1000-cow herd</th>
<th>AI Technicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items</td>
<td>A</td>
</tr>
<tr>
<td>CR, %</td>
<td>38</td>
</tr>
<tr>
<td>Breeding costs ($/cow/yr)</td>
<td>88</td>
</tr>
<tr>
<td>Profit ($/cow/yr)</td>
<td>179</td>
</tr>
</tbody>
</table>

For each point increases in CR (from 26% to 38%) represented an additional $6 per cow/yr
Conclusions

- Compliance with the AI procedure (semen handling, accuracy of ED, hygiene, site of semen deposition) affects the bottom line of dairy herds and should not be compromised for convenience.

- Investing in educational training for professional AI technicians should be a top priority.
Reproductive Audit - Case Study:

Effect of Management on Reproductive Performance in Beef Herds
Management and Reproductive Performance

- 50.2% (n=9,453 cows/heifers)
- Timed-AI Protocol: 7-d Progesterone device—50h Timed-IA
- One AI technician
- 57 herds (AA y H)
- Argentina
Pregnancy per AI by Herd

>72% of variation in CR is due to Management/Environment

Herds
Effect of Season on CR

(Adjusted by Parity, BCS, Herd, Breed, Bull)

Conception Risk (%)

(a,b P<0.05)

Fall

Spring

Fall: (n=5,184)
Spring: (n=4,269)
Effect of Parity on CR

(Adjusted by BCS, Herd, Breed, Season, Bull)

Conception Risk (%)

- Cows 2nd Calf
  - (n=88)
  - (a,bP<0.05)

- Heifers
  - (n=1,882)
  - a

- Cows
  - (n=19)
  - ab

- Cows/Calf
  - (n=7,464)
  - b
Effect of Breed on Conception Risk (CR)

(Adjusted by Parity, BCS, Herd, Season, Bull)

(P=0.88)

Conception Risk (%)

A. Angus (n=6.894)

Hereford (n=2.559)
Management Areas for Improvement According to their Contribution Weights on CR

- **Season**: Nutritional management of cows/heifers, especially for Fall AI
- **Semen Quality**: Assessment of semen quality prior to time-IA
- **Parity**: Especial attention to animals with high energy requirements (Cows-Calf pairs)
Acknowledgements

- AI technicians
- Dairy herds
Assumptions for the Model

- Total herd (lactating + dry) was set at 1000 cows
- VWP 70 d & dry period 60 d
- Cows were AI until 365 DIM
- HD set at 60%
- CR set at 30% (decreased by 2.5% for every subsequent AI)
- Pregnancy diagnosis and resynch of open cows 32 d after AI
Assumptions for the Model

- Abortion was set at 11.3% (9.7% from 32-90 days of gestation)
- Open cows were culled at random 0.04%/d; Income < cost of production; at 450 DIM
- Mortality set at 3% first 60 DIM; 0.46% for each 60 d period, including the dry period
Simulations

- Performed at 26% CR for 3,000 d, then the model was set at 32% for the subsequent 2,000 d to calculate the profits.

- Average values from 10 runs were used.
Simple Math

A powerful yet potentially underappreciated and underutilized tool in the veterinarian’s toolbox.

Lowell T. Midla VMD, MS
The Ohio State University
Large Animal Ambulatory Service
Marysville, OH
New grad vet sent to best dairy client…

Good ol’ Doc at AABP meeting.

New grad sent to do herd check…

• Herd is on monthly herd check.
• Thus cows are 35 to 65 DCC when palpated.
• 12 cows submitted:
  • 4 cows at 35 days: 1 preg / 3 open.
  • 4 cows at 50 days: 3 preg / 1 open.
  • 4 cows at 65 days: 4 preg / 0 open.

Client questions vet’s ability to find 35 day preg.

What does new grad / ol’ Doc reply?
New grad vet sent to best dairy client…

What are the expected results?

Upon what do they depend?

What are the criteria for submitting a cow to be checked?
New grad vet sent to best dairy client…

What are the expected results?
Upon what do they depend?

What are the criteria for submitting a cow to be checked?

1. Inseminated 35 to 65 days ago.
New grad vet sent to best dairy client...

What are the expected results?
Upon what do they depend?

What are the criteria for submitting a cow to be checked?

1. Inseminated 35 to 65 days ago.

AND

1. Has not been detected in heat (and re-inseminated) since.

So, submission primarily depends upon **HEAT DETECTION** rate.
New grad vet sent to best dairy client...

Primarily depends upon heat detection.

So, expected results:

- 2 preg / 2 open at 35 days (50%)
  - One opportunity to have detected estrus at 21 days (0.5).

- 3 preg / 1 open at 55 days (75%)
  - Two opportunities to have detected estrus (21, 42 days) (0.5 x 0.5).

- 3.5 preg / 0.5 open at 65 days (87.5%)
  - Three opportunities to have detected estrus (21, 42, 63) (0.5 x 0.5 x 0.5)
New grad vet sent to best dairy client...

<table>
<thead>
<tr>
<th>Expected:</th>
<th>Actual:</th>
</tr>
</thead>
<tbody>
<tr>
<td>35: 2 / 4</td>
<td>35: 1 / 4</td>
</tr>
<tr>
<td>55: 3 / 4</td>
<td>55: 3 / 4</td>
</tr>
<tr>
<td>65: 3.5 / 4</td>
<td>65: 4 / 4</td>
</tr>
</tbody>
</table>

So, with the exception of one 36 day cow, the results are exactly what we would have expected.
Ol’ Doc puts in some embryos...

Client typically has ET vet put in frozen embryos. ET vet out of town.

Doc puts in 6 eggs.

Chances of a frozen egg sticking are ~ 50%.

How many pregnancies should we expect?
Ol’ Doc puts in some embryos…

6 eggs / ~ 50% success: How many pregnancies should we expect?

Obviously 3 but...

- The probability of getting 3 is only 0.31

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>.02</td>
<td>.09</td>
<td>.23</td>
<td>.31</td>
<td>.23</td>
<td>.09</td>
<td>.02</td>
</tr>
</tbody>
</table>

Best way to illustrate: 50% is like a coin flip. If you flip the coin 1000 times, the likelihood of 490 to 510 heads is very high. But, if you look at groups of 6 on the way to 1000, it will not be heads – tails – heads – tails – etc. You will find several runs of 6 or more heads / 6 or more tails.
We wound up with 15 / 36 for 42% which may well have gotten us fired.
Cow is open after 6 breedings...

Palpate this cow Doc, and see what is wrong with her!
Cow is open after 6 breedings…

Palpate this cow and see what is wrong with her, Doc!

She very well may have no pyometra,
no endometritis,
no Lepto Hardjo-bovis,
no BVD,
no biological problem at all.

(Other than the dread disease: MATH.)
Cow is open after 6 breedings…

Assuming a reasonable conception rate of 33%…

100 cows inseminated…

1 100 x 0.33 = 33 preg / 67 open
2 67 x 0.33 = 22 preg (55 total) / 45 open
3 45 x 0.33 = 15 preg (70 total) / 30 open
4 30 x 0.33 = 10 preg (80 total) / 20 open
5 20 x 0.33 = 7 preg (87 total) / 13 open
6 13 x 0.33 = 4 preg (91 total) / 9 open.

So you still have 10% / 1 in 10 cows open at 200 dim ((21 x 6 = 126) + 70 day VWP = 196 DIM).

At a 50% heat detection rate it takes 17 trials to get above a 90% chance that there would be at least 6 inseminations. (21 x 17 = 357) + 70 day VWP = 427 DIM.
Real Data from 825 cow herd:
VWP = 58 days.
26 cows @ 6 times bred.
Average DIM = 383  (391 if you throw out one cow at 173 DIM)

\[ 58 + 357 = 415 \]

The point: I didn’t believe the 427/415 number- so I checked its validity with real data. 391 and 415 coincide / agree pretty well.
How many replacements are on the farm? / How many should be on the farm?

- 100 cows – Ideal World
- 13 month calving interval
  - 100 x 12 / 13 = 92 potential calves / year.
  - Lose 2 to EED / Abortion
  - Lose 1 stillborn
  - Lose 1 dystocia
  - 88 calves alive at birth
  - 44 heifer calves
  - First two weeks of life lose 2 to scours / pneumonia / etc.
  - Two weeks to breeding lose 1
  - 1 heifer fails to become pregnant

- 40
<table>
<thead>
<tr>
<th>DM Data Value</th>
<th>Number of Herds</th>
<th>Average</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preg Rate-Current</td>
<td>519</td>
<td>16.3</td>
<td>9.0</td>
<td>1.0</td>
<td>58.0</td>
</tr>
<tr>
<td>Preg Rate-Year Ave</td>
<td>442</td>
<td>16.1</td>
<td>5.2</td>
<td>0.0</td>
<td>37.0</td>
</tr>
<tr>
<td>Days Open-Proj Min-Total Herd</td>
<td>539</td>
<td>152.4</td>
<td>35.2</td>
<td>93.0</td>
<td>299.0</td>
</tr>
<tr>
<td>Proj Calving Interval</td>
<td>539</td>
<td>14.2</td>
<td>1.2</td>
<td>12.3</td>
<td>19.0</td>
</tr>
<tr>
<td>Actual Calving Interval</td>
<td>539</td>
<td>11.9</td>
<td>9.4</td>
<td>-0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Cows Calving-Current Test, %</td>
<td>539</td>
<td>11.9</td>
<td>9.4</td>
<td>-0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Births 4+ Calving Diff-1st Lact, %</td>
<td>220</td>
<td>6.0</td>
<td>11.8</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Days Open-Proj Min-1st Lact</td>
<td>539</td>
<td>154.6</td>
<td>47.2</td>
<td>78.0</td>
<td>563.0</td>
</tr>
<tr>
<td>Days Open-Proj Min-2nd Lact</td>
<td>538</td>
<td>150.3</td>
<td>39.3</td>
<td>60.0</td>
<td>335.0</td>
</tr>
<tr>
<td>Days Open-Proj Min-3rd+ Lact</td>
<td>539</td>
<td>151.8</td>
<td>37.2</td>
<td>80.0</td>
<td>317.0</td>
</tr>
<tr>
<td>Voluntary Waiting Period(VWP)</td>
<td>539</td>
<td>59.0</td>
<td>5.8</td>
<td>30.0</td>
<td>90.0</td>
</tr>
<tr>
<td>Days to 1st Serv-(%herd &lt; VWP)</td>
<td>480</td>
<td>19.6</td>
<td>14.4</td>
<td>1.0</td>
<td>84.0</td>
</tr>
<tr>
<td>Days to 1st Serv-(%VWP to 100D)</td>
<td>529</td>
<td>55.2</td>
<td>20.8</td>
<td>5.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Days to 1st Serv-(%herd &gt; 100D)</td>
<td>505</td>
<td>28.5</td>
<td>20.7</td>
<td>1.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Days to 1st Serv-Total Herd</td>
<td>530</td>
<td>91.5</td>
<td>24.0</td>
<td>57.0</td>
<td>251.0</td>
</tr>
<tr>
<td>Days to 1st Serv(%herd &lt;100D)-1st Lact</td>
<td>524</td>
<td>73.2</td>
<td>22.0</td>
<td>12.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Days to 1st Serv(%herd &lt;100D)-2nd Lact</td>
<td>524</td>
<td>75.0</td>
<td>21.3</td>
<td>10.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Days to 1st Serv(%herd &lt;100D)-3rd+ Lact</td>
<td>523</td>
<td>71.7</td>
<td>22.7</td>
<td>10.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Con Rate for Past 12M-1st Serv</td>
<td>539</td>
<td>41.8</td>
<td>17.8</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Con Rate for Past 12M-2nd Serv</td>
<td>539</td>
<td>40.4</td>
<td>17.6</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Con Rate for Past 12M-3rd+ Serv</td>
<td>539</td>
<td>39.8</td>
<td>18.2</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Serv per Preg-All Lact</td>
<td>530</td>
<td>3.2</td>
<td>1.0</td>
<td>1.0</td>
<td>8.6</td>
</tr>
<tr>
<td>Serv per Preg-1st Lact</td>
<td>527</td>
<td>3.0</td>
<td>1.1</td>
<td>0.9</td>
<td>8.3</td>
</tr>
<tr>
<td>Serv per Preg-2nd Lact</td>
<td>529</td>
<td>3.3</td>
<td>1.4</td>
<td>0.9</td>
<td>14.0</td>
</tr>
<tr>
<td>Serv per Preg-3rd+ Lact</td>
<td>529</td>
<td>3.4</td>
<td>1.4</td>
<td>1.0</td>
<td>11.3</td>
</tr>
<tr>
<td>Heats Observed for Year, %</td>
<td>521</td>
<td>44.7</td>
<td>16.4</td>
<td>1.0</td>
<td>88.0</td>
</tr>
<tr>
<td>Heats Observed-Last Test, %</td>
<td>495</td>
<td>48.0</td>
<td>19.6</td>
<td>1.0</td>
<td>98.0</td>
</tr>
<tr>
<td>Abortions in Past Year</td>
<td>539</td>
<td>1.0</td>
<td>2.7</td>
<td>0.0</td>
<td>36.0</td>
</tr>
<tr>
<td>Calvings in Past Year</td>
<td>539</td>
<td>190.2</td>
<td>310.5</td>
<td>15.0</td>
<td>3123.0</td>
</tr>
<tr>
<td>Dry Less Than 40 Days, %</td>
<td>486</td>
<td>17.6</td>
<td>17.1</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Dry More Than 70 Days, %</td>
<td>527</td>
<td>17.6</td>
<td>12.4</td>
<td>1.0</td>
<td>87.0</td>
</tr>
<tr>
<td>DM Data Value</td>
<td>Number of Herds</td>
<td>Average</td>
<td>Std Dev</td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-----------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Number of Cows-All Lact</td>
<td>539</td>
<td>178.4</td>
<td>284.1</td>
<td>21.0</td>
<td>2675.0</td>
</tr>
<tr>
<td>Number of Cows-1st Lact</td>
<td>539</td>
<td>69.9</td>
<td>119.8</td>
<td>2.0</td>
<td>1224.0</td>
</tr>
<tr>
<td>Number of Cows-2nd Lact</td>
<td>538</td>
<td>51.0</td>
<td>85.1</td>
<td>5.0</td>
<td>892.0</td>
</tr>
<tr>
<td>Number of Cows-3rd Lact</td>
<td>539</td>
<td>57.5</td>
<td>86.6</td>
<td>4.0</td>
<td>763.0</td>
</tr>
<tr>
<td>Number of Cows-Year Chg %</td>
<td>523</td>
<td>1.0</td>
<td>16.1</td>
<td>-51.0</td>
<td>256.0</td>
</tr>
<tr>
<td>In Milk on Test Day, %</td>
<td>539</td>
<td>87.4</td>
<td>5.1</td>
<td>53.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Days in Milk</td>
<td>539</td>
<td>177.8</td>
<td>29.7</td>
<td>98.0</td>
<td>365.0</td>
</tr>
<tr>
<td>Age of 1st Lact Cows</td>
<td>539</td>
<td>25.8</td>
<td>2.2</td>
<td>21.0</td>
<td>38.0</td>
</tr>
<tr>
<td>Cows Left Herd-All Lact, %</td>
<td>520</td>
<td>10.9</td>
<td>10.9</td>
<td>15.0</td>
<td>95.0</td>
</tr>
<tr>
<td>Cows Left Herd-1st Lact, %</td>
<td>525</td>
<td>10.2</td>
<td>7.8</td>
<td>0.0</td>
<td>72.0</td>
</tr>
<tr>
<td>Cows Left Herd-2nd Lact, %</td>
<td>525</td>
<td>10.1</td>
<td>5.1</td>
<td>0.0</td>
<td>39.0</td>
</tr>
<tr>
<td>Cows Left Herd-3rd Lact, %</td>
<td>525</td>
<td>19.3</td>
<td>6.2</td>
<td>1.0</td>
<td>47.0</td>
</tr>
<tr>
<td>Cows Died-All Lact, %</td>
<td>539</td>
<td>5.6</td>
<td>4.1</td>
<td>0.0</td>
<td>26.0</td>
</tr>
<tr>
<td>Cows Died-1st Lact, %</td>
<td>539</td>
<td>1.2</td>
<td>1.5</td>
<td>0.0</td>
<td>13.0</td>
</tr>
<tr>
<td>Cows Died-2nd Lact, %</td>
<td>539</td>
<td>1.3</td>
<td>1.5</td>
<td>0.0</td>
<td>13.0</td>
</tr>
<tr>
<td>Cows Died-3rd Lact, %</td>
<td>539</td>
<td>3.1</td>
<td>2.6</td>
<td>0.0</td>
<td>18.0</td>
</tr>
<tr>
<td>Cows Left Herd for Repro-All Lact, %</td>
<td>539</td>
<td>4.3</td>
<td>5.1</td>
<td>0.0</td>
<td>28.0</td>
</tr>
<tr>
<td>Cows Left Herd for Repro-1st Lact, %</td>
<td>539</td>
<td>1.2</td>
<td>1.7</td>
<td>0.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Cows Left Herd for Repro-2nd Lact, %</td>
<td>539</td>
<td>1.3</td>
<td>1.8</td>
<td>0.0</td>
<td>10.0</td>
</tr>
<tr>
<td>Cows Left Herd for Repro-3rd Lact, %</td>
<td>539</td>
<td>1.8</td>
<td>2.5</td>
<td>0.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Daily Val Prod-Milk Cows</td>
<td>539</td>
<td>12.1</td>
<td>4.6</td>
<td>2.2</td>
<td>40.0</td>
</tr>
<tr>
<td>Daily Feedcost-Milk Cows</td>
<td>539</td>
<td>6.4</td>
<td>6.4</td>
<td>6.4</td>
<td>6.4</td>
</tr>
<tr>
<td>Daily Inc/Feed-Milk Cows</td>
<td>539</td>
<td>7.8</td>
<td>7.8</td>
<td>7.8</td>
<td>7.8</td>
</tr>
<tr>
<td>Milk Blend Price</td>
<td>539</td>
<td>17.3</td>
<td>5.9</td>
<td>10.0</td>
<td>52.0</td>
</tr>
<tr>
<td>Organic</td>
<td>200</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

~530 Ohio Holstein herds – from DRMS Dairymetrics
How many replacements are on the farm? / How many should be on the farm?

- 100 cows – **Real World** – using Dairymetrics / NAHMS data.
- 14 month calving interval
  - $100 \times 12 / 14 = 86$ potential calves / year.
  - Lose 5 to EED / Abortion
  - Lose 5 stillborn / dystocia
  - 76 calves alive at birth
  - 38 heifer calves
  - First two weeks of life lose 3 to scours / pneumonia / etc.
  - Two weeks to breeding lose 1
  - 1 heifer fails to become pregnant

- **33**
  - Note: Still doesn’t count heifer twin to bull, 2yo that wrecks, etc.
Palpation pregnancy rate:

- Note: PPR is NOT PR / pregnancy rate.
- 1000 cow dairy – weekly herd check.
- 18 cows presented for preg check – 16 pregnant.
- Palpation pregnancy rate = 89%

- Did the client have a good day?
Palpation Pregnancy Rate...

- 1000 cow dairy – weekly herd check.
- 18 cows presented for preg check – 16 pregnant.
- Did the client have a good day?

- 1000 / 52 = 19 pregnancies per week (i.e. per herd check) to maintain 12 month calving interval.

- 1000 / 50 = 20 is what I usually use…
  - “Pushes” in the right direction.
  - Easier to calculate in your head.
  - Helps to make up for EED / abortions.

- Divide herd size by 12 for monthly herd checks. (Duh.)
Palpation Pregnancy Rate…

• So we needed 20 but only got 16…

What is the next investigative step?
Palpation Pregnancy Rate…

• So we needed 20 but only got 16…

  What is the next investigative step?

How many cows were inseminated -5 to -6 weeks ago? (Assuming you are palpating cows between 34 and 42 DCC.)

• At 0.33 conception rate, if you want to end up with 20 pregnancies then you need to inseminate 60 cows.

• If client only bred 45 cows then there is your problem.

• However, note the slug phenomenon.
And now for fun…

Trillion Dollar Platinum Coin?

$1,000,000,000,000$

- $x$ ounce per $1580$
- $x$ pound per 16 ounces
- $x$ ton per 2000 pounds

$= 20,000$ TON coin.

Note: only approx 450 tons of platinum mined / year = 44 years.
Take home messages:

• Most math can be done in your head.
  • Brain is like a muscle - exercise it and it gets stronger.

• Don’t just wonder about it / guess... Figure it out.
  • 1 btl Ca++?: 1320lbs. / 2.2lb/kg = 600l / 3 = 200l x 10dl/l = 2000dl. 10.7g = 10,700mg / 2000dl > 5mg/dl

• Math can be used to motivate / convince clients.
  • Example:
    • Tie-stall barn Ov-Synch
      HDR x CR = PR
      50 x 0.4 = 20%
      100 x 0.3 = 30%
Any Questions?

Lowell T. Midla
The Ohio State University
937-642-2936  midla.1@osu.edu
Why gadgets & gizmos

- Improve billable hours on the farm
- Improve client communication
- Increase consistency of care between veterinarians of a practice
- Put technology tools to use on the farms that are not using them
Google Drive

• Formerly “Google Docs”
• Apps available for variety of platforms
• Can share files, folders, documents
• Can upload spreadsheets, documents, pictures, pdf files, presentations
<table>
<thead>
<tr>
<th>Title</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alvin Oberholtzer Shared</td>
<td>Country Roads Veterinary Services</td>
</tr>
<tr>
<td>Alvin Sensenig Shared</td>
<td>Country Roads Veterinary Services</td>
</tr>
<tr>
<td>Amos H. Zimmerman Shared</td>
<td>Country Roads Veterinary Services</td>
</tr>
<tr>
<td>Amos O. Zimmerman Shared</td>
<td>Country Roads Veterinary Services</td>
</tr>
<tr>
<td>Berrnell Zimmerman Shared</td>
<td>Country Roads Veterinary Services</td>
</tr>
<tr>
<td>Breezy Acres Shared</td>
<td>Country Roads Veterinary Services</td>
</tr>
<tr>
<td>Calvin Oberholtzer Shared</td>
<td>Country Roads Veterinary Services</td>
</tr>
<tr>
<td>Clair Oberholtzer Shared</td>
<td>Country Roads Veterinary Services</td>
</tr>
<tr>
<td>Clayton Oberholtzer Shared</td>
<td>Country Roads Veterinary Services</td>
</tr>
<tr>
<td>Cletus Garver Shared</td>
<td>Country Roads Veterinary Services</td>
</tr>
<tr>
<td>Curvin Burkholder Shared</td>
<td>Country Roads Veterinary Services</td>
</tr>
<tr>
<td>Date</td>
<td>FAT</td>
</tr>
<tr>
<td>------------</td>
<td>------</td>
</tr>
<tr>
<td>12/19/2012</td>
<td>3.78</td>
</tr>
<tr>
<td>12/15/2012</td>
<td>3.77</td>
</tr>
<tr>
<td>12/13/2012</td>
<td>3.82</td>
</tr>
<tr>
<td>12/12/2012</td>
<td>3.89</td>
</tr>
<tr>
<td>12/9/2012</td>
<td>3.89</td>
</tr>
<tr>
<td>12/7/2012</td>
<td>3.9</td>
</tr>
<tr>
<td>12/6/2012</td>
<td>3.79</td>
</tr>
<tr>
<td>12/3/2012</td>
<td>3.7</td>
</tr>
<tr>
<td>12/1/2012</td>
<td>3.61</td>
</tr>
<tr>
<td>11/23/2012</td>
<td>4.08</td>
</tr>
<tr>
<td>1/21/2012</td>
<td>4.17</td>
</tr>
<tr>
<td>11/19/2012</td>
<td>4.23</td>
</tr>
<tr>
<td>11/17/2012</td>
<td>4.19</td>
</tr>
<tr>
<td>11/15/2012</td>
<td>4.05</td>
</tr>
<tr>
<td>11/12/2012</td>
<td>4.06</td>
</tr>
<tr>
<td>11/11/2012</td>
<td>3.94</td>
</tr>
<tr>
<td>11/9/2012</td>
<td>3.91</td>
</tr>
<tr>
<td>11/7/2012</td>
<td>4.01</td>
</tr>
<tr>
<td>11/3/2012</td>
<td>3.92</td>
</tr>
<tr>
<td>11/1/2012</td>
<td>3.81</td>
</tr>
<tr>
<td>10/28/2012</td>
<td>3.76</td>
</tr>
<tr>
<td>10/26/2012</td>
<td>3.69</td>
</tr>
<tr>
<td>10/24/2012</td>
<td>3.67</td>
</tr>
<tr>
<td>10/22/2012</td>
<td>3.71</td>
</tr>
<tr>
<td>10/20/2012</td>
<td>3.7</td>
</tr>
<tr>
<td>10/18/2012</td>
<td>3.76</td>
</tr>
<tr>
<td>10/17/2012</td>
<td>3.71</td>
</tr>
<tr>
<td>10/14/2012</td>
<td>3.61</td>
</tr>
<tr>
<td>10/12/2012</td>
<td>3.69</td>
</tr>
<tr>
<td>10/10/2012</td>
<td>3.61</td>
</tr>
</tbody>
</table>
MilkPay
Adisseo

Details  Ratings and Reviews  Related

Screenshots

The MilkPay Calculator is an easy-to-use app that lets you determine the profitability of your dairy formulations using the latest FMMO pricing data for components.

To begin using the MilkPay Calculator, choose your FMMO area from the map below:

© 2012 Adisseo
Choose Your FMMO Area

(Use the map to the right, or the list below)

- Pacific Northwest #124
- Upper Midwest #30
- Central #32
- Southwest #126
- Mideast #33
- Northeast #1

Consolidated Federal Milk Marketing Order Areas
(shaded areas indicate FMMO areas that are paid on components)

Download the offline version of the Milkpay calculator
### Income Data

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Adjusted</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat ($/cwt)</td>
<td>$6.565</td>
<td>$6.910</td>
<td>$0.346</td>
</tr>
<tr>
<td>Protein ($/cwt)</td>
<td>$9.934</td>
<td>$10.596</td>
<td>$0.662</td>
</tr>
<tr>
<td>Other Solids ($/cwt)</td>
<td>$0.000</td>
<td>$0.000</td>
<td>$0.000</td>
</tr>
<tr>
<td>PPD ($/cwt)</td>
<td>$(0.450)</td>
<td>$(0.450)</td>
<td>$0.000</td>
</tr>
<tr>
<td>Premiums ($/cwt)</td>
<td>$0.315</td>
<td>$0.315</td>
<td>$0.000</td>
</tr>
<tr>
<td>Milk Price/cwt</td>
<td>$16.36</td>
<td>$17.37</td>
<td>$1.01</td>
</tr>
<tr>
<td>Milk Income/cow/day</td>
<td>$13.09</td>
<td>$13.90</td>
<td>$0.81</td>
</tr>
<tr>
<td>Milk Income/herd/day</td>
<td>$1,309</td>
<td>$1,390</td>
<td>$81</td>
</tr>
<tr>
<td>Milk Income/herd/month</td>
<td>$39,819</td>
<td>$42,271</td>
<td>$2,452</td>
</tr>
<tr>
<td>Milk Income/ herd/year</td>
<td>$477,822</td>
<td>$507,250</td>
<td>$29,427</td>
</tr>
</tbody>
</table>

### FCM/ECM/MBM

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Adjusted</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat Corrected Milk</td>
<td>$4,964.22</td>
<td>$5,223.68</td>
<td>$259.46</td>
</tr>
<tr>
<td>Energy Corrected Milk</td>
<td>$5,798.96</td>
<td>$6,128.56</td>
<td>$329.60</td>
</tr>
<tr>
<td>Money Corrected Milk</td>
<td>$70.49</td>
<td>$74.79</td>
<td>$4.31</td>
</tr>
</tbody>
</table>

### Economic Impact

<table>
<thead>
<tr>
<th></th>
<th>Per Cow/Day</th>
<th>Per Herd/Year*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjusted Income Impact</td>
<td>$0.81</td>
<td>$29,427</td>
</tr>
<tr>
<td>Adjusted Feed Cost</td>
<td>$0.25</td>
<td>$9,125</td>
</tr>
<tr>
<td>Adjusted Income Over Feed Cost (IOFC)</td>
<td>$0.56</td>
<td>$20,302</td>
</tr>
</tbody>
</table>

### ROI: 3.22

### Value

<table>
<thead>
<tr>
<th></th>
<th>Per Cow/Day</th>
<th>Per Herd/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 lb of milk</td>
<td>$0.164</td>
<td>$5,973</td>
</tr>
</tbody>
</table>
Description

iPrep is an on farm diagnostic tool for evaluating prep procedures in dairy parlors.

The iPrep app gives every dairyman the opportunity to monitor their prep procedure by simplifying an industry standard.

Lauren International Web Site ➤ iPrep Support ➤

iPhone Screenshots

$4.99
Category: Business
Released: Jan 13, 2011
Version: 1.0
Size: 1.0 MB
Language: English
Seller: Lauren International, Inc.
© Lauren AgriSystems, LTD
Rated 4+

Requirements: Compatible with iPhone, iPod touch, and iPad. Requires iOS 3.0 or later

Customer Ratings

We have not received enough ratings to display an average for the current version of this application.
# Teat Health

**Recent Activity**  **Enter Scores**  **Manage Cow Groups**  **Reporting**  **Compare Dairies**

**Request Date Range:** 9/22/2007 - 1/7/2013

**Completed Teat Scores**

<table>
<thead>
<tr>
<th>Date of Scoring</th>
<th>Teats Scored By</th>
<th>Date Entered Into Database</th>
<th>Total Cows Scored</th>
<th>Scored 0-2</th>
<th>Scored 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/27/2012</td>
<td>Fred Gingrich</td>
<td>12/27/2012</td>
<td>155</td>
<td>75.6%</td>
<td>17.2%</td>
</tr>
<tr>
<td>9/22/2007</td>
<td>Fred Gingrich</td>
<td>4/18/2012</td>
<td>141</td>
<td>74.6%</td>
<td>18.4%</td>
</tr>
</tbody>
</table>

**Percent of teats that fall within a certain score: 9/22/2007 to 1/7/2013**

![Graph showing percentage of teats scored within different score ranges](image-url)
### Breezy Acres

**Cow Breed:** Holstein  
**Number of Milking Cows:** 135  
**Milking Frequency:** 2  
**Milking Equipment Manufacturer:**  
**Parlor Type:** Herringbone  
**Number of Milking Units:** 24  
**Liner Barrel Shape:** Triangle  
**Liner Brand:** OTHER  
**Vacuum Level:** 13  
**Pulsator Rate:** 0  
**Pulsator Ratio:** 65.35  
**ATO Setting:** SCC: 0  
**Milkose ID:**  
**Date Scores Collect:** 12/27/2012  
**Date Scores Added:** 12/27/2012

### Overview of This Session By Teat

<table>
<thead>
<tr>
<th></th>
<th>0-2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Scores:</td>
<td>467</td>
<td>106</td>
<td>45</td>
</tr>
<tr>
<td>% of Total:</td>
<td>75.6%</td>
<td>17.2%</td>
<td>7.3%</td>
</tr>
</tbody>
</table>

### Overview of This Session By Group

**Group:** milk  
**# Cows:** 155

<table>
<thead>
<tr>
<th></th>
<th>Left Front</th>
<th>Right Front</th>
<th>Left Rear</th>
<th>Right Rear</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Score:</td>
<td>2.08</td>
<td>2.06</td>
<td>1.77</td>
<td>1.65</td>
<td>1.89</td>
</tr>
<tr>
<td>Total Tests:</td>
<td>155</td>
<td>154</td>
<td>155</td>
<td>154</td>
<td>618</td>
</tr>
<tr>
<td>0-2</td>
<td>70.3%</td>
<td>66.9%</td>
<td>81.9%</td>
<td>83.1%</td>
<td>75.6%</td>
</tr>
<tr>
<td>3</td>
<td>20.0%</td>
<td>23.4%</td>
<td>13.5%</td>
<td>11.7%</td>
<td>17.2%</td>
</tr>
<tr>
<td>4</td>
<td>9.7%</td>
<td>3.7%</td>
<td>4.5%</td>
<td>5.2%</td>
<td>7.3%</td>
</tr>
</tbody>
</table>
Farm Call Invoice Program
Herd Health Services

Client: Tom Sawyer
Date of Service: 1/6/2013
Invoice Number: 130106/104106

Health Exam
- U/S Repo Ex: Yes
- CIDR: No
- Palpation: No
- U/S Mare: No
- Milk Sys Dry: No
- Milk Sys Wet: No
- Dehorn Calf: No
- Melox/Local: No
- Large Corneal: No
- Medications Dispensed: Bluelight, Bovikalk

Dehorn Large: No
Mycopar Vac: Yes
XYL Sedation: No
Euthanasia: cc Fatal Plus
Other Service: No
Other Descr: 

Necropsy Services
- Necropsy: No
- History: 
- Findings: 
- Tissue Lab: 

Consultancy Services
- Discussion: Calf scours and colostrum management
- Disc. Topics: 

Buttons:
- Save and Go Back to Farm Main
- Save and Go To Surgery
- Save and Go To Sick Cow Exam
- Save and Go To Lameness Exam
- Save and Go To Follow Up
- Save and Go To OB/Dystocia
- Cancel this Record
Questions?

Ashes of Problem Clients