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Golden State Dairy Newsletter
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Back to Basics: How well does your mixer wagon weigh feed ingredients?

Ed DePeters – UC Davis and Jennifer Heguy – UCCE Merced, Stanislaus & San Joaquin

Checking the accuracy of the load cells on a mixer wagon is often an overlooked task. In a 2010 California survey, 79% of dairy producers reported checking the mixer scale at least once a year, with only 19% checking accuracy at least monthly. Considerable time and money are expended to create rations that support milk production and overall herd health. If your load cells are not functioning properly, you are not providing optimum nutrition to your cows and heifers. You are also not obtaining accurate information about your feed inventory and shrink could be a result of load cells that are not accurate. With feed accounting for more than 50% of the cost to produce milk, proper mixer wagon calibration and maintenance will save you money.

We consider both precision and accuracy when weighing feed ingredients. ***Precision*** refers to how consistently a scale weighs the same object when that object is weighed multiple times. For example, I can take the same cereal serving and my kitchen scale repeatedly reads 29 grams. My kitchen scale is precise! Precision indicates how close the repeated measurements of weight are, but that precision does not mean the weight measured is accurate. ***Accuracy*** is how close a measured weight is to the actual weight of an object. Consider that serving of cereal has a true weight of 39 grams. That would indicate that while my kitchen scale is precise, it is not accurate. In the field, mixer wagon "bouncing" of up to 90 pounds has been reported: scale accuracy is an issue on some dairies.

There are different approaches to measuring the accuracy of your wagon's load cells. A good approach is to contact your mixer wagon's manufacturer/dealer and ask that a knowledgeable technician check your load cells. Your nutritionist might also have thoughts on how often and how to check the load cells on your mixer wagon.

In the UC Davis dairy production class, students check the accuracy of mixer wagons on dairy farms during their field trips. Here is our simplified approach:

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- The wagon/truck is on a flat surface, without slope, and not running.

- We have 4 pipe-hooks that are used at the 'corners' of the mixer wagon (see picture). Each pipe-hook bar weighs 10 pounds (we adjust the bar weight to 10 pounds by adding sand into the pipe). We have four 50-pound standard weights. When we add a bar to the mixer wagon corner, the scale should read 10 pounds. We continue to add a bar to each remaining corner and read the weight. Once all four bars are placed on the mixer box, we start adding the 50-pound weights one at a time and take readings. Add a 50-pound weight and the scale should indicate the addition of 50 pounds. We do that for each bar.

Picture: UC Davis student adding 50-pound standard weights to each individual bar after placing the four pipe hooks. Red arrows identify the pipe-hooks.

- Because of our class timing we can only do either an empty or a loaded wagon. The process would be improved by checking accuracy of the wagon both empty and loaded.

Digital scales are typically set with 5- or 10-pound increments because of the dairy environment. Wind, uneven surfaces, and the fact that the wagon is running while being loaded are challenges to scales. If your cell has a five-pound increment, a value of 45 – 55 pounds per corner would be within range in the above example. For teaching purposes, 50 pounds is enough weight to go through the process while ensuring student safety and participation.

Load-cell technology is more complicated than what we described here. Mixer wagons are often equipped with shear beam load cells. A shear beam measures a force and then resistance (bending of a metal bar) that is detected by a strain gauge in the load cell. This generates an electrical signal that will yield a numeric measurement of weight. Shear beam load cells are accurate, dependable, and perform well in rugged situations where mixer wagons are often used.

In addition to checking the accuracy of mixer wagons, you could also incorporate some simple maintenance practices that can be assigned to employees. They include removing any feed or dirt/mud trapped between the mixer box and the wagon frame, as well as checking for kinked wiring and possible damage to a load cell.

Take Home Message: Routine maintenance of your mixer wagon (grease/lubrication, changing gear-box oil, checking bearings, belts, and chains, and changing cutter blades/knives) should also include checking the accuracy of your load cells. Accurate weights of feedstuffs will create TMRs that support optimum cow performance and save money in the long term.

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Tuesday, February 11th
Seminar Trailer 2

Hot Topics, 11:30 am

Beef x dairy crossbred cattle in the feedlot: Performance & carcass characteristics
Brooke Latack, UCCE Livestock Advisor

Byproduct usage in California dairy rations
Jennifer Heguy, UCCE Dairy Advisor

How feed additives can help the dairy industry be part of a climate solution
Frank Mitloehner, UC Davis & UC ANR

Agronomic Crop Management, 12:30 pm

Weed management in small grains
Jorge Angeles, UCCE Weed Management Advisor

Chickweed herbicide resistance in small grain forages & alfalfa
Nicholas Clark, UCCE Agronomy Advisor

Website: https://ucanr.edu/sites/CAdairyconference/

Tuesday, February 11th
Seminar Trailer 2

Manure & Pest Management, 1:30 pm

Managing compost bedded pack barns for success in California
Randi Black, UCCE Dairy Advisor

Bird's eye view of manure nitrogen management in California
Deanne Meyer, UC Davis & UC ANR

Use of botanical oils to reduce biting fly activity
Alec Gerry, UC Riverside & UC ANR

Wednesday, February 12th
Seminar Trailer 2

Herd Health, 1:30 pm

Impacts of colostrum management on calf health & growth during the preweaning period
Betsy Karle, UCCE Dairy Advisor

Naval disease: The silent killer
Noelia Silva-del-Rio, UC Davis & UC ANR

Improving health management on the dairy: New tools for on-farm training of farmworkers
Richard Pereira, UC Davis

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Metritis: We Are Still Working on Diagnosing It

Rúbia Branco-Lopes – UCCE Tulare & Kings Counties

Metritis is a common infectious disease in dairy cattle that negatively affects herd profitability by decreasing milk production and reproductive efficiency and increasing the risk of early culling. Metritis is defined by an abnormally enlarged uterus, fetid, watery, red-brown uterine discharge associated with signs of systemic illness, and fever (> 103° F) within 21 days in milk (DIM; Sheldon et al., 2006). Fever, while included in the proposed standardized criteria for diagnosing metritis, remains controversial because of its weak association with reduced milk production. A California study that evaluated fresh cow health-monitoring practices on 45 dairies revealed that cows showing nonspecific signs of illness (e.g., depression, appetite loss, or reduced milk yield) were treated for metritis based solely on the presence of fever in 29% of dairies (Espadamala et al., 2018). Additionally, 18% of California dairies treated cows for metritis when only fever was observed.

Study. A recent study analyzed whether fever (≥103° F) is associated with the severity of metritis (diagnosed based on vaginal discharge), which was assessed based on its effects on reproduction, milk production, and herd removal (Figueiredo et al., 2024). It involved 6,419 Holstein cows across nine dairy farms (six in Florida and three in California). Vaginal discharge (**VD**) was assessed within 12 days postpartum and categorized into five groups (**Figure 1**). Rectal temperature was measured in a subset of VD 5 cows (n = 862 cows from 5 of 6 dairies in Florida) to evaluate the presence of fever, defined as a rectal temperature of 103° F or higher. The study was conducted over a full year at three dairies and from December to July at the other two. All VD 5 cows, regardless of fever, were treated based on each dairy's treatment protocol.

Study findings. Fever was not associated with significant differences in reproductive performance or milk production among cows with fetid vaginal discharge (**VD 5**: watery, reddish-brown discharge, **Figure 1** and **Table 1**). This suggests that **fever may <u>not</u> reliably indicate the <u>severity</u> of metritis**. The authors acknowledged that the duration of the fever event, rather than its occurrence, could be a critical factor. However, the assessment of fever was limited to cows housed in Florida, with rectal temperature measurements conducted only up to 12 DIM.

Figure 1. Vaginal discharge score (authors combined VD 1 and VD 2 = VD 1/2; Figueiredo et al., 2024)

VD 1 & 2 = clear mucus or lochia, with or without flecks of pus
VD 3 = mucopurulent discharge containing less than 50% pus
VD 4 = mucopurulent discharge with 50% or more pus or nonfetid reddish-brown mucus
VD 5 = fetid, watery, reddish-brown discharge (**<u>indicative of metritis</u>**)

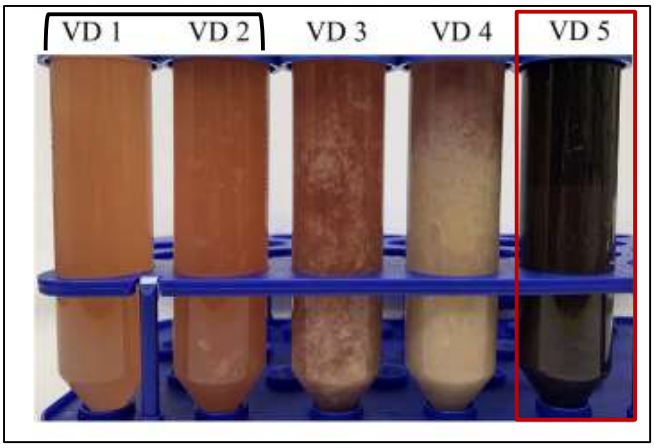

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Table 1. Reproductive and productive outcomes according to vaginal discharge score and fever in VD5 cows (numbers were rounded up)

	Metritis (VD 5)		
Outcome	**No fever** (n = 558)	**Fever** (n = 304)	*P*-value
Pregnancy by 300 DIM (%)	57	61	0.38
Removal by 300 DIM (%)	29	21	0.02
Milk Production (lb)	21,316	21,755	0.42

As expected, fetid vaginal discharge (VD 5) had poorer reproductive and productive outcomes compared to cows with milder discharge. Fewer VD 5 cows (64.4%) were pregnant by 300 DIM compared to cows with VD scores 1 to 4, which had a similar rate (averaging 75.8%). VD 5 cows also had a higher herd removal rate and produced 1,675 lb less milk within 300 DIM than cows in the other VD groups, which had similar milk production levels.

Take home messages:

- Among cows with fetid vaginal discharge (VD 5), fever seems to have limited value to predict future production and reproduction outcomes.
- Fetid, watery, reddish-brown discharge (VD 5) is the key sign of metritis. This discharge is associated with poor reproductive performance, lower milk production, and higher herd removal.
- Discuss your current postpartum health monitoring and treatment protocol for metritis with your veterinarian.

References

Espadamala, A., R. Pereira, P. Pallarés, A. Lago, and N. Silva-Del-Río. 2018. Metritis diagnosis and treatment practices in 45 dairy farms in California. J. Dairy Sci. 101:9608–9616. https://doi.org/10.3168/jds .2017-14296

Figueiredo, C. C., S. Casaro, F. Cunha, V. R. Merenda, E. B. de Oliveira, P. Pinedo, and K. N. Galvão. 2024. Evaluating differences in milk production, reproductive performance, and survival associated with vaginal discharge characteristics and fever in postpartum dairy cows. J. Dairy Sci. 107:6079–6089. https://doi.org/10.3168/jds.2023-23905

Sheldon, I. M., G. S. Lewis, S. LeBlanc, and R. O. Gilbert. 2006. Defining postpartum uterine disease in cattle. Theriogenology 65:1516– 1530. https://doi.org/10.1016/j.theriogenology.2005.08.021

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University of California Cooperative Extension

Golden State Dairy Newsletter

Merced, Stanislaus & San JoaquinCounties

February 2025

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