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NDS Dynamics

Formulating Rations in NDS – Should I Apply a Lead Factor? Part 2: An Addendum

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with appreciation for input from Dr. Chen Gild, DVM; Dr. Larry Chase, PhD; and Dr. Charlie Sniffen, PhD.

The last issue of NDS-Dynamics newsletter we discussed lead factors, and it stimulated some great feedback and comments. We would like to thank those who responded. Such discussions are helpful and useful, and we would like to encourage more user feedback on topics related to ration formulation and NDS. To this end we will be trying a new endeavor to stimulate discussion when we put out future newsletters. Starting soon, we will be posting the newsletters on the several Facebook pages "RUM&N-NDS Professional", "Rumen Nds" and on the "Dairy-Tech Group" Facebook page, where we hope readers will post comments and questions on the newsletter topics, and there can be some discussion. There were several excellent comments and feedback on the last newsletter topic about using lead factors, which we will follow up on below in this month's newsletter.

Fresh Pens and Lead Factors: One thoughtful international NDS user, Dr. Chen Gild in Israel, questioned how to handle fresh cows:

"One of the things that disturbs me with this is that there was a sentence in the text stating that this does not apply for fresh cow groups. There was no description of what should be done with those cows in relation to intake, nutrient values etc. My question to you is, here we do not have fresh groups, we did for a while and most of our farmers backed off. Seeing that fresh cows do eat the same ration as all groups, would you recommend taking this in to account when characterizing the model cow in our situation. This is especially important since production here and DIM are very fluctuant and from October till March we get most of our calvings, or the other option would be to adjust the diet as production changes, for me this sounds a bit skew."

The paragraph in the last newsletter regarding fresh cows was intended to address situations where there are fresh pens containing mostly very fresh cows. In the field I see "Fresh" pens where cows stay for only a week or ten days, to "fresh" pens where cows stay for a month or more. My intent was to suggest that when the pen is a very fresh pen, we know that the intake is rising fairly quickly on individual cows, and the milk yield of individual cows is also rising, but the pen average for either DMI or milk yield is often relatively low compared to the potential. I recently looked at a fresh pen where the average days in milk was only 16 days, the DMI was ~ 38 lbs. (17.25 kg), and milk was 54 lbs. (24.5 kg). The previous month the pen was 20 days fresh, and averaged 65 lbs. In this case, the pen "averages", either for milk or intake, were quite variable over a week, and sensitive to the number of recent calvings, and the number of those that were heifers. So it does not seem to me to make sense to formulate to a fresh pen "average", partly because it is a daily moving target, especially over the intervals between times I might either visit the dairy or reformulate the diet. So my approach for that farm is to formulate for ~ 38 lbs. of milk, to formulate for as much milk as I can support at 38 lbs. intake - while still keeping the fresh diet a little higher in fiber and lower in starch and starch fermentability; typically I am formulating the fresh ration for ~75-78 lbs. milk. This can usually only be accomplished if the expected body weight change is set to be ~0.5 to ~0.7 BCS decrease in 30 days, so that the model is incorporating use of body reserves for lactation. This is NOT a recommendation, simply a case report for a single herd that has a 28,000+ herd average and a high proportion of heifers. Most of my herds have a fresh pen, and they typically target ~ 14 to 30 days residence for cows in that pen, so I frequently use some variation of this formulation strategy.

Where herds do not have a fresh pen, and fresh cows move into the high pen after calving, we usually formulate the high pen for the pen average intake and milk. If there are a large number of fresh cows coming into the pen it may be reasonable to bias this up or down from the group average dry matter intake or milk yield, but doing so requires estimating the expected production and intakes of high cows in the pen, and the proportion of the cows in the pen that are fresh. If a very high proportion of fresh cows is being fed the high group diet, one might consider reducing the fermentable starch levels either to avoid transitioning cows onto a diet that might induce SARA, or to accommodate the hepatic oxidation theory in order to bring cows on feed better.

These strategies are not necessarily absolutely correct or optimal; but they have worked reasonably well. I am part of a group of investigators at Cornell that is assessing optimal transition strategies; among other things we are comparing herds that use a fresh ration postcalving then step up to a high ration, and comparing with herds that put postcalving cows right on the high ration after freshening. We will have better insight into this when we finish the analysis.

Pen Moves to Lower Production Pens: Another item that came up in the feedback was where to target low groups. A response from Dr. Charlie Sniffen to the newsletter pointed out that if cows are moving from a higher group to a lower group *"when the cows move to the low group we again do not feed to the average but closer to what the cows are making when moved into the low group."* I agree with Dr. Sniffen on that, and should have been more careful to elaborate that situation. My focus in the newsletter was on the high groups or on herds where a single ration is fed to most all cows, or all except the fresh cows or a "stale" pen. I concur with Dr. Sniffen that if cows are moving to a lower pen - not necessarily a "low" pen - maybe just from a breeding pen to a "pregnant pen" where most cows are still milking well for instance - it is not a good idea to formulate to the lower pen average. This is because, at least in my experience, there can be a significant "hit" or decrease in intake and yield in these situations when the receiving pen ration is too dissimilar to the higher ration. In such circumstances I decrease the density of the lower ration a small amount relative to the higher ration, somewhat arbitrarily removing a pound or maybe two of concentrate, and ignoring the predicted allowable milk. Dr. Sniffen suggested that "*we need a more structured approach to this issue"*. I think we also need more data on how well the "HOT" theory integrates into this kind of situation, where large differences in starch might be considered for instance.

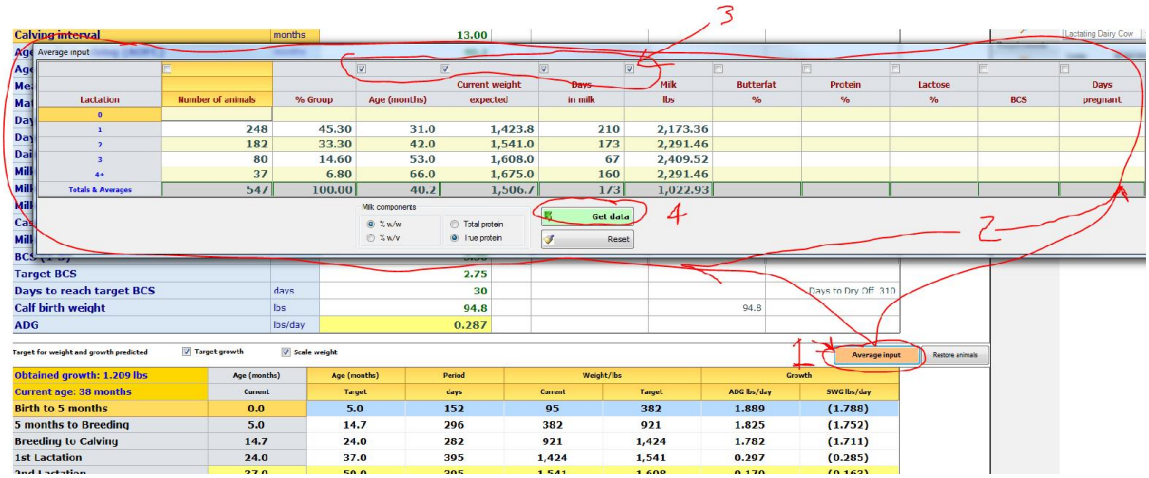
The need for a more consistent approach to this issue was also highlighted in a response from Dr. Larry Chase, who said *"I think we need to get some numbers to really answer this question. I have data …. where we have individual cow BW, milk, DMI etc. for cows in tie-stalls fed the "same" TMR. It will be interesting to run each cow through CNCPS and see how the ME and MP intakes and balances look for each cow. This should be helpful in getting better information on this concept."* The idea Dr. Chase is suggesting is an excellent one, and if users had DHI data that would allow them to adjust the intake of each cow based on production, and estimate of bodyweight based on age and or lactation, it would be a very interesting and useful exercise.

A study similar to this idea was reported at the ADSA annual meeting in 2014 by Ferguson et al., who used a version of the UPENN Ration Analyzer, which is a CNCPS model modified from the CPM version. Their abstract was titled "Evaluating Rations Offered to a Group of Cattle as a Component of Ration Formulation Software". Using over a million DHIA records from over 2000 herds, they derived inputs for breed, lactation, bodyweights and proportion of cows in each lactation, and then simulated lactation curves for a variety of herd production levels using that data. Using these, they then stochastically simulated individual cows in herds and in groups within herds, used an NRC prediction for DMI, and applied a single modeled ration to each cow at the intake and production assigned to the cow in the simulation. They then assessed how well the ration "fit" the overall herd based on the expected ME and MP balances of each cow.

They made several conclusions, and have used the "group" model to usefully regroup cows in real herds. The conclusion they report that is germane to our discussion was that *"Actual milk production within groups on a dairy farm should conform to that predicted in the model, and DMI of the groups should be within 10% of model predictions. If not, then the grouping of cows and / or feeding management need to be reviewed."* (Ferguson et al. 2014). They also suggested that *"less than 20% of early lactation cows should fall below -10 Mcal/d balance and -400 g/d MP balance; cows should return to positive ME balance by 50 DIM, and to positive MP balance by 40 DIM; that after 100 DIM the positive ME balance should approach 5 Mcal/d, and the positive MP balance should approach 400 g/d."* It is fairly clear what would need to be done to evaluate diets using this approach and these guidelines on an individual cow basis in a real herd; it

amounts to having the capability to easily execute the suggestion of looking at ME and MP balances of individual cows, as Dr. Chase suggested above. In the future perhaps this could be facilitated by software that could import production records by cow, then iterate over the records to calculate individual ME and MP requirements and expected intake, and see how well a diet formulated for the pen was balanced for each cow. Nonetheless, currently there is no easy way to apply a given diet to multiple cows in the same group and evaluate the extent to which individual cows, and subgroups within the group, are either at, or over, or under balanced for ME and MP.

Dr. Chase commented that *users seem to enter values into the animal inputs often without much effort to accurately determine what accurate values are for those animal inputs of the cows that will be fed the ration*. I wholeheartedly agree, we users rarely spend enough time getting accurate bodyweights, current average cow age, adjusting current environmental inputs etc. For instance, given that most commercial dairies do not have scale weights for their cows during lactation, when is the last time a representative sample of the cows in any of your herds were weight taped? Related to the accuracy of the inputs, Dr. Sniffen noted that using the weighted average inputs for the group really improves the accuracy of the group definition. To do this click the "Average Input" button (1 below), enter the data in the popup table (2) as available from herd management software such as DHIA reports, DC305, DHI-Plus, or PC-Dart etc., then check the boxes (3) for the fields for which a weighted average will be used, getting the data into your animal inputs by clicking on the "Get Data" (4) button.



In any case, one very strong argument for formulating at least the high groups at the actual group average intake, production, and other inputs is that this allows the expected response to the new ration to be compared with the actual performance of the current ration. If we change the milk yield or the DMI by using a lead factor, or for some other reason, it is then difficult to make that comparison on an "apples to apples" basis. A comparison can still be made, but it takes a few more steps and more time to accomplish. Also, to be most effective formulating for group averages, we have to do a good job of entering accurate input values.

Send us your comments on these topics please…what do you think about the best level to formulate rations at? Dave is at rumendvm@gmail.com; Buzz is at bburhans@dairynutritionhealth.com

Note that the features and utilities developed by the NDS team described above are not components of the underlying CNCPS model, and do not change the CNCPS outputs or results. *Questions about use of these features should be directed to the NDS support team, and not to the CNCPS group at Cornell.*