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NDS Dynamics

NDS Features: Using uNDF30 for Evaluating Changes in Intake Associated with Rumen Fill

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Information on uNDF240 (last month's newsletter) also shows up on a new NDS feature, the new "Rumen Fill" tab to the right of the "Intake" tab at the mid/lower left side of the recipe screen. This tab contains additional information about uNDF (uNDF240), and also assesses uNDF30 intake. Note that the tab reports total DMI and the predicted rumen uNDF content. Values are expressed three ways, as an amount (lbs or Kg /day), as a %DM, and as a %BW. If a user has changed the ration since the last save, both Initial recipe and values from the changed recipe (Current) are shown.

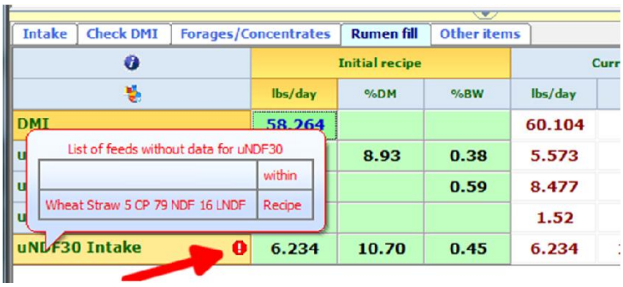
Intake | Check DMI | Forages/Concentrates | Rumen fill | Other items

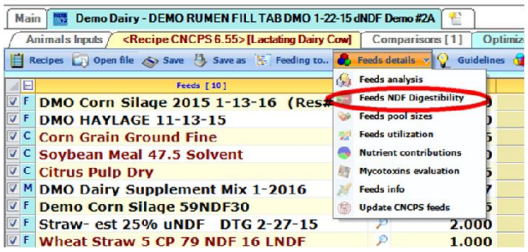
	Initial recipe			Current recipe			DMI lbs/day	
	lbs/day	%DM	%BW	lbs/day	%DM	%BW	Delta	Expected
DMI	57.344			57.344				
uNDF Intake	4.837	8.44	0.35	4.972	8.67	0.36	-1.559	55.786
uNDF Rumen	7.764		0.56	7.912		0.58	-1.072	56.272
uNDF Ratio Rumen/Intake	1.61			1.59				
uNDF30 Intake	5.145	8.97	0.37	5.617	9.79	0.41	-4.815	52.529

At the far right the third section on the tab shows an expected change in DMI for the current (changed) ration compared to the Initial (last saved) ration. Both ***the amount of DMI change (Delta)*** and ***the expected actual intake after that change*** occurs are shown. **This expected change is predicted by calculating the change in DMI of the current ration that would be necessary to have the intake of the changed (Current, center section) ration deliver the same amount of uNDF or uNDF30 as the Initial ration (left section) did.** In the example shown, to return the expected uNDF intake back to 4.837 lbs, the intake of the Current ration would have to decrease by 1.559 lbs. to eliminate the extra 0.135 lbs. of uNDF intake (4.972-4.837 = 0.135). Further support of the concept that ruminal NDF content is fairly fixed or stable and therefore can regulate intake can be inferred from work by Kramer et al. (2013) who demonstrated that at higher levels of forage (75F:25C vs 50F:50C), there was an increase in rumen content of iNDF , a decrease in DMI (consistent with the higher iNDF load), but no significant difference in total rumen NDF content. This is consistent with uNDF30 as a gut fill signal.

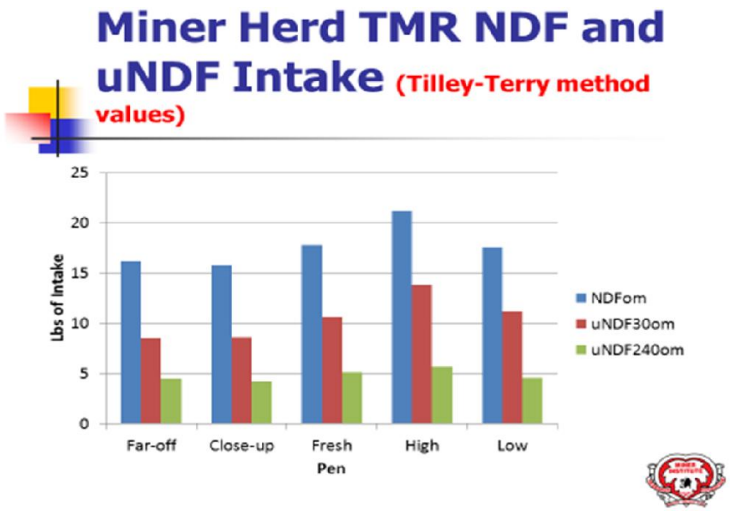
Forage uNDF30 intake (bottom tab row) as an indicator of gut fill was proposed by Jones (Jones 2015, Jones & Jones, 2014) as a better estimate of gut fill. Their premise is that rumen fill of NDF at a given time includes not only the amount of indigestible NDF (estimated as uNDF240), but includes the total ruminal NDF content, which is the sum of the iNDF240 plus the potentially digestible NDF (pdNDF) content present (i.e. pdNDF not yet either digested or passed from the rumen). The uNDF at 30 hours is a reasonable estimate of total rumen NDF content (Jones, 2014). Jones further suggested that since small feed particles pass from the rumen fairly quickly, the estimate of uNDF30 should be applied only to forage NDF. The application of forage uNDF30 as an indicator of rumen fill is a plausible supposition, and may indeed be a better indicator of rumen fill than uNDF240. In fact, recent work has shown that digestible NDF has a longer rumen retention time than iNDF (Lund, 2006), probably due to selective retention, perhaps mediated by differences in particle fragility, size, and density.

On the Rumen Fill tab, if a forage included in the ration does not have a 30 hour NDF digestibility a red icon appears (image below left). Hovering over that icon brings up a balloon identifying the specific feed(s) without uNDF30 values. Also, clicking on “Feeds Details” at the recipe screen top allows access to a table “Feeds NDF Digestibility” (below right).





Forage uNDF30 intake might be a better indicator of rumen fill than total iNDF intake, but no dataset has evaluated this comparison. However, work at Miner Institute compared total diet uNDF240 with total diet uNDF30 across physiological states (Cotanch, 2015). In that data uNDF240 intake was a more consistent amount across physiological states than uNDF30. However, Jones contends that uNDF30 should be applied to forage only, because NDF in smaller concentrate particles passes more quickly and thus contributes little to rumen fill. Because of prior experience and familiarity with iNDF, and especially considering the consistency of uNDF240 intake in the Miner data, I am continuing to monitor primarily iNDF, estimated either as uNDF240, or lignin x 2.4. But, I am watching uNDF30 intake closely because conceptually the case for it being superior proposed by Jones is plausible and reasonable.



In either case, checking the rumen fill tab and values for either uNDF or uNDF30 can be useful in assessing the possibility that a diet might limit intake and reduce performance. Jones has also suggested that being familiar with the typical uNDF30 intake amounts (in lbs. or kg.) of herds fed similar diets can be useful when troubleshooting. He suggests that if the uNDF30 intake exceeds the expected range (herd specific, typically ~5-6 lb.?), forage quality or amount may contribute to reduced intake and therefore milk yield. Worth a check when troubleshooting or reformulating. I am grateful to the NDS developers for their willingness to implement both of these concepts, as both tabs are useful and improve my ration formulation / reformulation. These improvements confer a competitive advantage for NDS users.

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 model 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.*

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