

AMINOCOW[®] Know How

Helpful hints for the effective use of AminoCow[®]

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Nitrogen needs to support rumen microbial growth

Q: My rations frequently are deficient in rumen degradable protein (RDP) according to AminoCow[®]. How concerned should I be with this? When I correct the deficiency, I find the crude protein level (as % of DM) to be high.

For economic and cow health reasons, AminoCow users often want to optimize rumen microbial output. Because energy for microbial growth is mostly fermentable carbohydrate (both fiber and NFC), a nitrogen source is needed to support the manufacture of microbial protein. With increasing levels of NFC in a ration, more microbial growth is fueled, requiring more nitrogen. Within AminoCow, this relationship is handled in a direct manner whereby the RDP requirement is set by the NFC supply in the ration (divided by a constant factor of 3.2). This relationship was established from the research of Stokes et al. in 1991.

To reiterate: **RDP requirement = NFC supply / 3.2**

While this is stated as a requirement, the nutrient needs of the cow to make the prescribed level of production can still be met, even if the RDP requirement is not met. The RDP requirement is not a cow requirement but rather a microbial requirement to achieve optimal microbial yield. When RDP is low, the contribution of amino acids from microbial protein will be less than it could be. This will need to be supplemented with additional amino acids from rumen undegradable protein (RUP). Commonly, this is more costly than boosting microbial protein by supplying additional RDP.

Q: Can nitrogen recycling by the cow compensate for the RDP deficiency? To what extent does the RDP deficiency affect amino acid delivery?

Dairy cattle are able to recycle nitrogen to the rumen via saliva. While research to define the limits of this capability is unclear, AminoCow includes a function to adjust microbial protein contribution for deficiency in RDP. This function can be selected in the setup screen to run automatically. When this is done, you will see the box 'Adjst MCRP RDP' is checked on the Ration Worksheet (see figure 1.1).

Feeds		Nutrient Information																
Mi	Feed Name	Ty	A/Fed	DM	DM%	NEI	CP	RDP	RUP	ADF	NDF	NFC	\$ZDM	Fat	MP	Met	Lys	Ca
						Mcal/kg	% DM	% CP	% CP	% DM	% DM	% DM	% DM	% DM	% DM	% DM	% DM	% DM
0	All hay mid bln	F	4.0000	3.6900	90.00	1.30	17.00	72.00	28.00	35.00	46.00	25.30	0.045	2.60	0	0.245	0.783	1.41
0	Corn sil Pcd 40	F	16.5000	5.7750	35.00	1.54	9.50	70.00	30.00	23.00	44.00	39.50	0.071	3.00	0	0.129	0.267	0.23
0	Grass sil mid bl	F	4.0000	1.8000	45.00	1.39	12.00	75.00	25.00	34.00	61.00	15.40	0.022	2.60	0	0.147	0.389	0.30
0	Barley grn	G	1.0000	0.8800	88.00	1.94	13.50	79.00	21.00	7.00	19.00	62.80	0.062	2.10	0	0.220	0.457	0.05
0	Canola meal sol	G	1.0000	0.9400	94.00	1.72	44.00	70.00	30.00	18.00	36.00	11.00	0.096	1.20	0	0.074	2.341	0.73
0	Corn grn grd	G	7.0000	6.1600	88.00	1.58	10.00	50.00	50.00	3.00	9.00	75.10	0.011	4.30	0	0.210	0.286	0.03
0	Soybean ml 48	G	2.5000	2.2250	89.00	2.01	55.00	70.00	30.00	6.00	10.00	27.50	0.002	1.00	0	0.755	3.285	0.29
0	Soybean whl ro	G	1.0000	0.9100	91.00	2.18	42.00	50.00	50.00	10.00	15.00	17.70	0.049	19.00	0	0.591	2.571	0.27
Concentrations						1.71	18.31	65.90	34.10	17.23	30.12	42.73	0.039	3.60		2.060	7.190	0.39
Totals						38.05	4.08	2.69	1.39	3.84	6.71	9.52	0.074	0.60	2304	48.000	168.000	67.50
Requirements						39.50	4.02	2.98		4.18	6.33	8.37		1.13	2011	54.000	166.000	178.4
Difference						-1.45		-0.29		-0.34	0.38	1.16		-0.33	293	-6.000	0.000	-90.98

(Figure 1.1)



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This box can be clicked off or on directly on the Ration Worksheet. Then click the <Recalc All> button to adjust the values for the change. When the 'Adjust MCRP RDP' box is unchecked, the amino acid contribution from microbial production is unrestricted even when nitrogen is limiting fermentation and solely related to the fermentable energy in the ration.

Another means of checking the impact of the RDP deficiency is to add urea to the ration. AminoCow does not distinguish between sources of RDP. While research indicates microbial growth can be optimized by providing peptides rather than simply a nitrogen source such as urea, AminoCow considers that typical commercial rations will provide adequate peptide supply. So adding urea will remove the RDP deficiency and thus increase microbial protein yield.

Cautions

1. Problems with diets high in NFC relative to NDF may be prevented by low RDP levels. However, supplying higher levels of RDP can lead to rapid carbohydrate fermentation and acidosis problems.
2. Rations with an RDP deficiency can be balanced in terms of amino acid supply for the cow. The RDP deficiency simply means that rumen microbial protein is less than it could be under optimal conditions. Typically this means that more bypass protein has to supply the required amino acids. Use amino acid supply relative to requirements as a guide.
3. Some rations show an RDP deficiency. You should consider whether NFC is in excess and whether it can be reduced by replacing grain with forage or non-fiber forage sources. Often, improvements in rumen health occur from this change and result in more consistent dry matter intake and rumen output.

Quick Summary

- Rumen microbes need a nitrogen supply (RDP) to compliment the fermentable carbohydrates they use as energy to fuel their growth.
- RDP requirements are a guide rather than a „strict cow requirement“.
- Consider whether the deficiency is due to a shortage of RDP or an excess of NFC.



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