

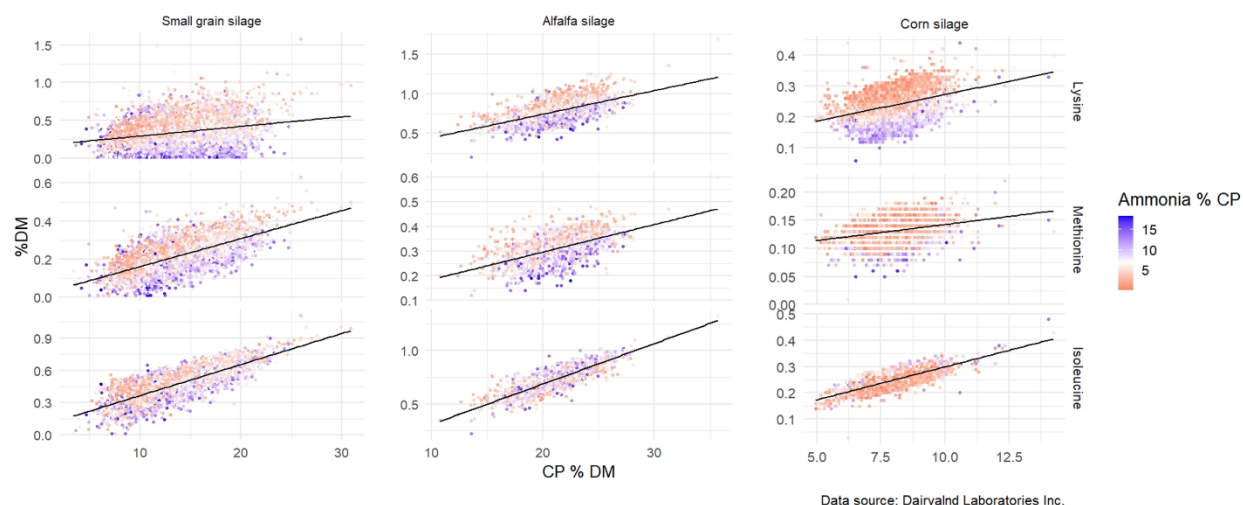
Are Poor fermentations Degrading Silage Amino Acids?



DAIRYLAND
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Over the first year of including amino acids in NIR packages for silages, we've observed these trends:

- Silages with high ammonia (or soluble protein) consistently contain lower amino acid levels
- Some amino acids are impacted more than others



What might be causing these trends?

It looks like amino acids are being deaminated due to poor or extended fermentation during ensiling. As bacteria and fungi break down proteins, deamination results in ammonia production (raising ammonia while lowering amino acids). Clostridium species are especially known for their proteolytic and deaminating activities.

But why are some amino acids being degraded more than others? Lysine has a unique structure with a side chain amino group, which could make it more susceptible to deamination. Methionine and cysteine are unique in that they contain a sulfur atom, which can cause them to be targeted preferentially by bacteria and fungi. In contrast, isoleucine, leucine, and valine are branch chain amino acids with more hydrophobic side chains, which could make them less susceptible to microbial attack.

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How much does this matter?

In this example diet, moving the silages' amino acids and ammonia from a standard deviation on one side of average to the other changed CNCPS predictions of MP allowable milk 2 lbs, MP supply 44 grams, lysine supply 5 grams, and methionine supply 1 gram.

Feed	Lbs/day DM
Corn silage	15
Alfalfa silage	15
HMSC	10
Protein/mineral mix	10
Total	50

Parameter	1 SD high	1 SD low	Difference
ME allowable milk	83.2	83.1	0.1
MP allowable milk	83.6	81.5	2.1
MP Supply (g)	2518.8	2474.7	44.1
Lys (g)	171.7	166.4	5.3
Met (g)	54.0	52.7	1.3
His (g)	74.8	71.9	2.9

Within this “normal range” of silage qualities the magnitude of impact isn’t severe, but silage quality is not evenly distributed, and the long tail of poorer fermentations can get ugly. How much MP is truly being lost in those small grain silages where ammonia runs over 30% of CP and lysine approaches 0? or those butyric haylages where ammonia averages 20% of CP?

NIR measurements of lysine, methionine, histidine, leucine, and isoleucine are included in Dairyland’s CNCPS and NASEM Complete packages for all forages and several non-forage ingredients. Combined with XML imports, these impacts of fermentation quality on amino acid concentrations are accounted for in most formulation software by default.

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