Amino acid levels in forages

CVB Cattle Nutrition

10 December – Melle

12 December - Wageningen

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Presentation Overview

- Current information in CVB Feed Table
- Recent analyses amino acids in maize silages and prewilted grass silages
- Relation between silage characteristics and amino acid content
- Impact on diet level => digestible amino acids
- Wrap up and conclusion

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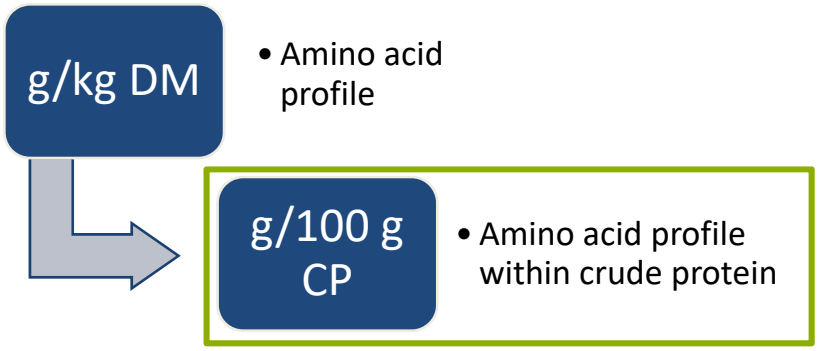
Information in the CVB Table



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Current CVB Table

- Maize silages (n=45)
- Prewilted grass silages (n=78)
- Analysis results from the period 1984-1996
- Only Crude Protein available
- Dry matter content was fixed at 400 g/kg for prewilted grass and 300 g/kg for maize silages

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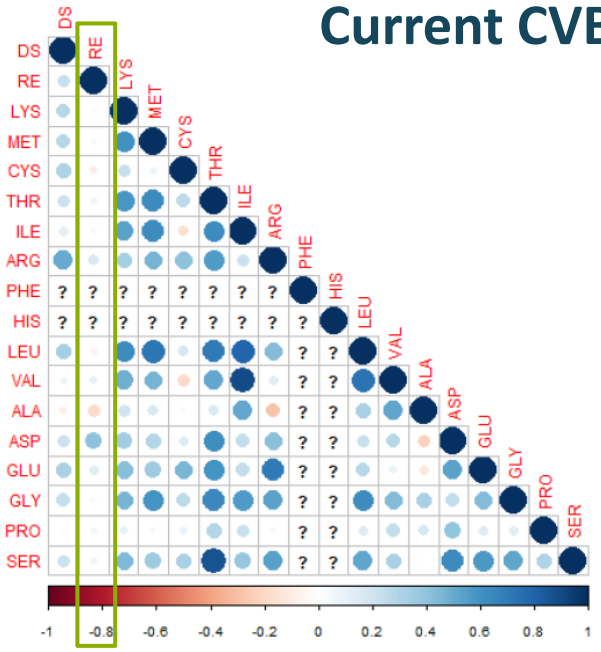
Current CVB Table



Grass silages (n=78)

No correlation between amino acid content and crude protein

- DS: Dry matter as 100 - moisture
- RE: Crude protein without correction for volatile substances
- Amino acid content (in g/100 g CP)

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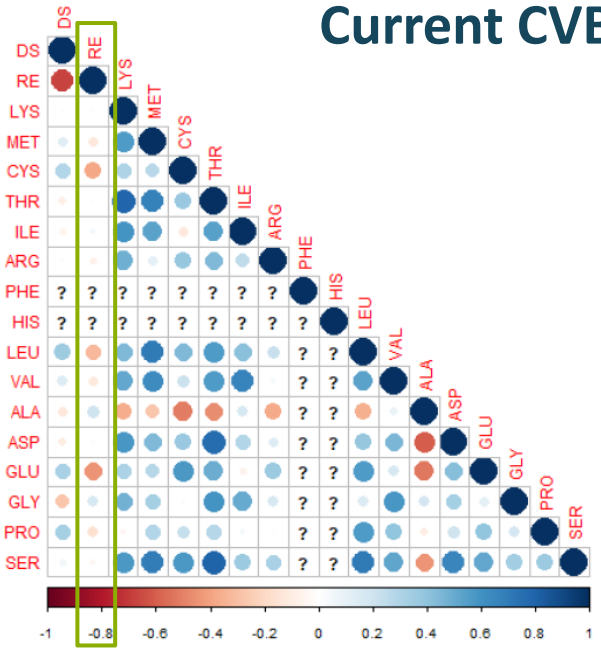
Current CVB Table



Maize silages (n=45)

No correlation between amino acid content and crude protein

- DS: Dry matter as 100 - moisture
- RE: Crude protein without correction for volatile substances
- Amino acid content (in g/100 g CP)

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Research Objectives

New analyses of Amino Acid profile in a set of prewilted grass and maize silages

- Is amino acid profile for grass silages and maize silages in CVB table still adequate?
- Do we need to differentiate the amino acid profile in prewilted grass and maize silage in relation to silage characteristics?

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ILVO Study Grass Silages 2019

- Twelve grass silages
- Weende and Van Soest characteristics available
- Rumen degradation and intestinal digestibility was determined in situ (@ILVO)
- Amino acids were determined, except for tyrosine and tryptophan (EC, 1998)

Grass silages (n=12)

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ILVO Study Grass Silages 2019

	Dry Matter	Ash	Crude Protein	Ether Extract	Crude Fiber	Sugars	NDF	ADF	ADL
Mean	397	107	160	35	262	39	462	282	24
St. Dev.	95	24	32	7	28	28	60	35	9
Min	285	75	114	23	214	6	374	229	11
Max	587	144	214	45	303	88	556	338	39

Grass silages (n=12)

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ILVO Study Grass Silages 2019

g/100g CP)	ILVO (n=12)	CVB (n=78)
Lysine	3.2 ± 0.6	3.3 ± 0.5
Threonine	4.1 ± 0.8	3.4 ± 0.5
Isoleucine	3.7 ± 0.3	3.9 ± 0.2
Methionine	1.2 ± 0.1	1.1 ± 0.2
Cystine	0.6 ± 0.1	0.5 ± 0.1
Asparaginezuur	8.5 ± 0.9	9.5 ± 1.6
Serine	3.1 ± 0.3	3.3 ± 0.6
Glutaminezuur	6.9 ± 0.5	7.0 ± 1.0
Proline	5.7 ± 0.6	5.2 ± 0.6
Glycine	4.1 ± 0.2	4.3 ± 0.4
Alanine	6.1 ± 0.5	5.4 ± 0.2
Valine	4.2 ± 0.9	5.0 ± 0.2
Leucine	6.1 ± 0.5	6.2 ± 0.6
Phenylalanine	3.9 ± 0.3	4.0 ± 0.4
Histidine	1.2 ± 0.1	1.3 ± 0.2
Arginine	2.0 ± 0.4	2.8 ± 0.4

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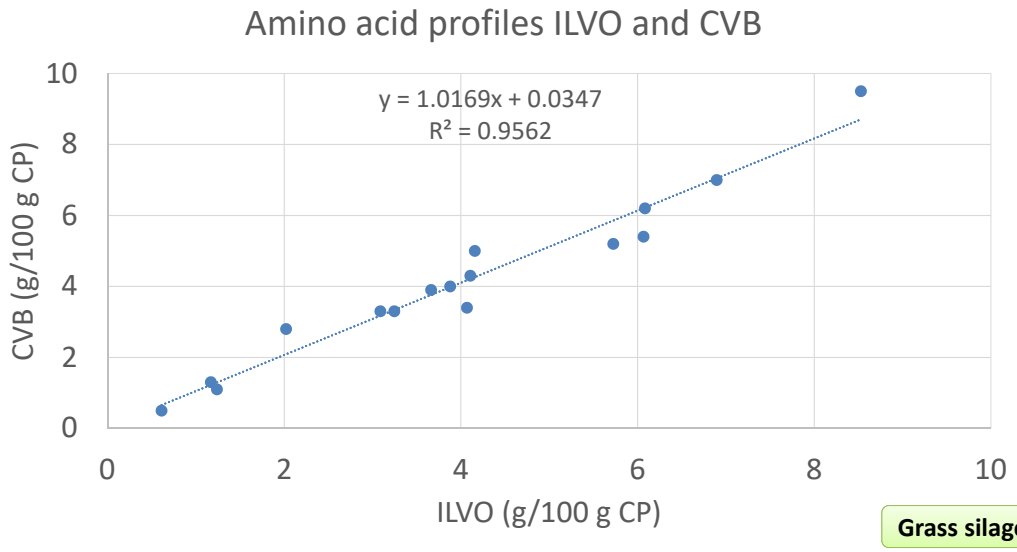
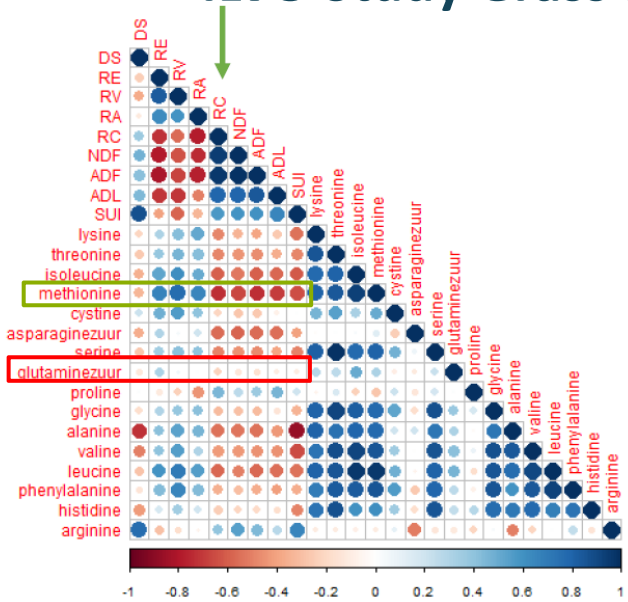
ILVO Study Grass Silages 2019



Grass silages (n=12)

ILVO

ILVO Study Grass Silages 2019



Grass silages (n=12)

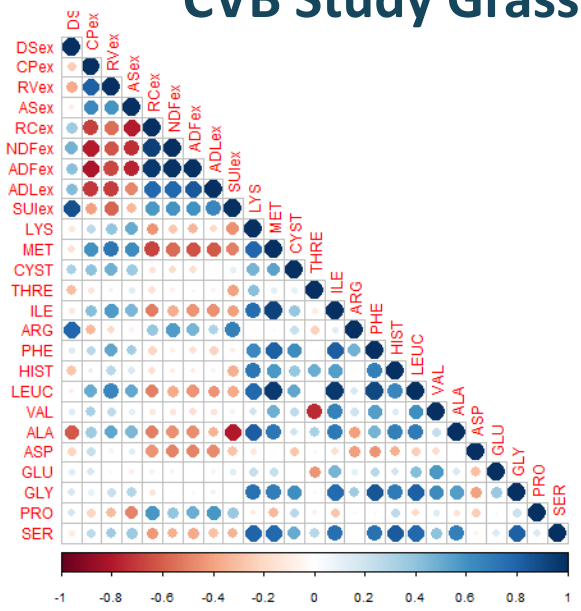
Especially correlation for methionine

Almost no correlation for glutamine

Grass silages (n=12)

ILVO

CVB Study Grass Silages 2019



Grass silages (n=12)

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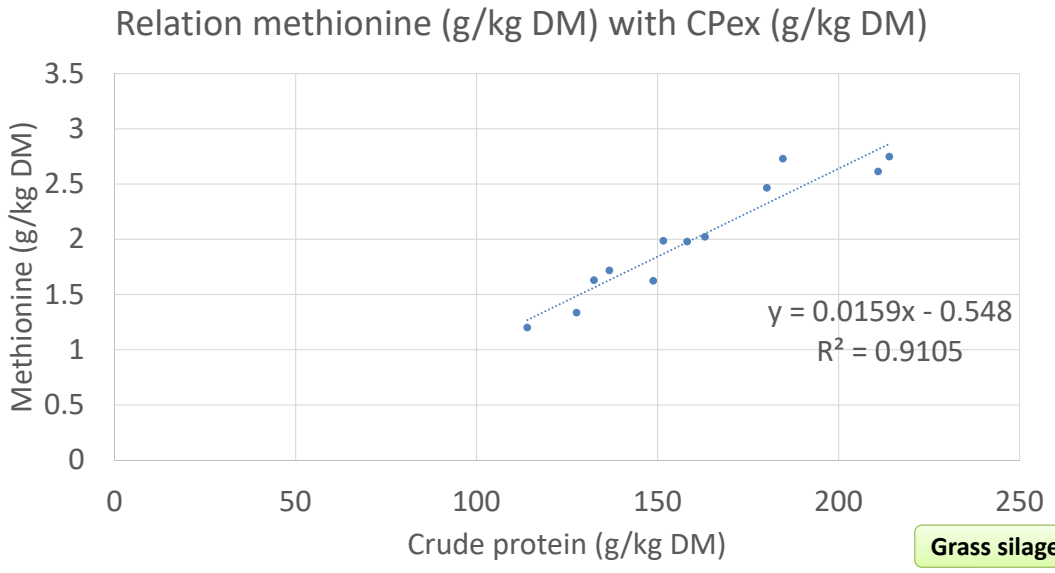
Methionine in grass silages



Grass silages (n=12)

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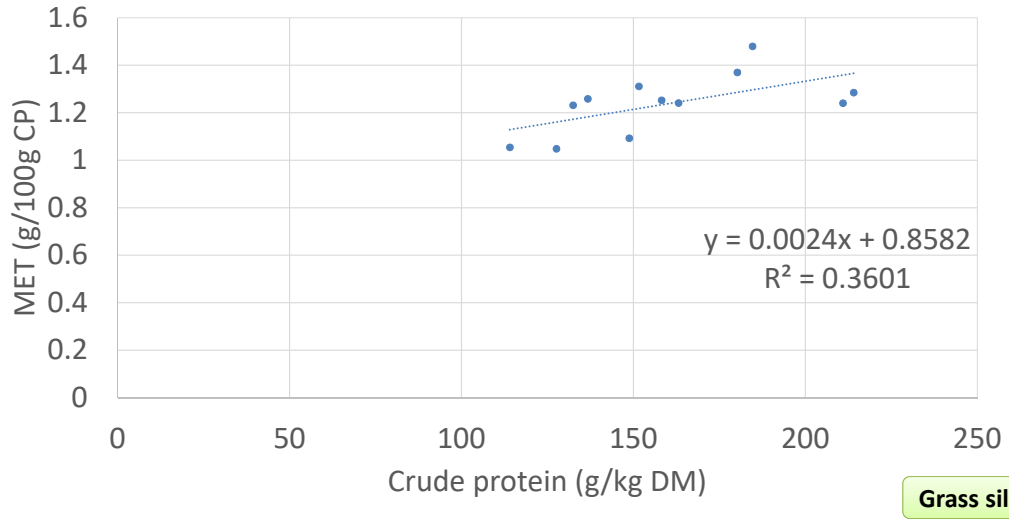
Methionine in grass silages

Relation MET (g/100g CP) with CPex (g/kg DM)



Grass silages (n=12)

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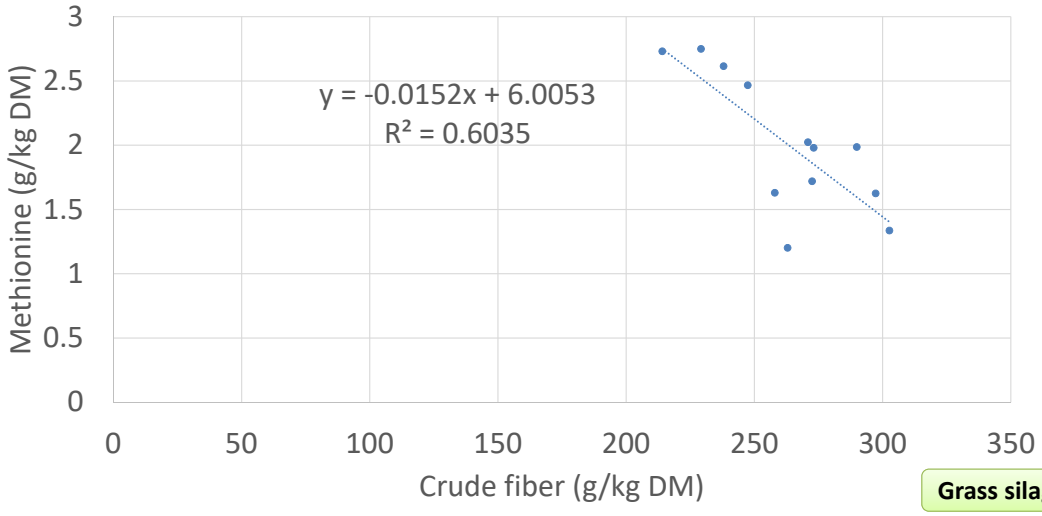
Methionine in grass silages

Relation methionine (g/kg DM) with RCex (g/kg DM)



Grass silages (n=12)

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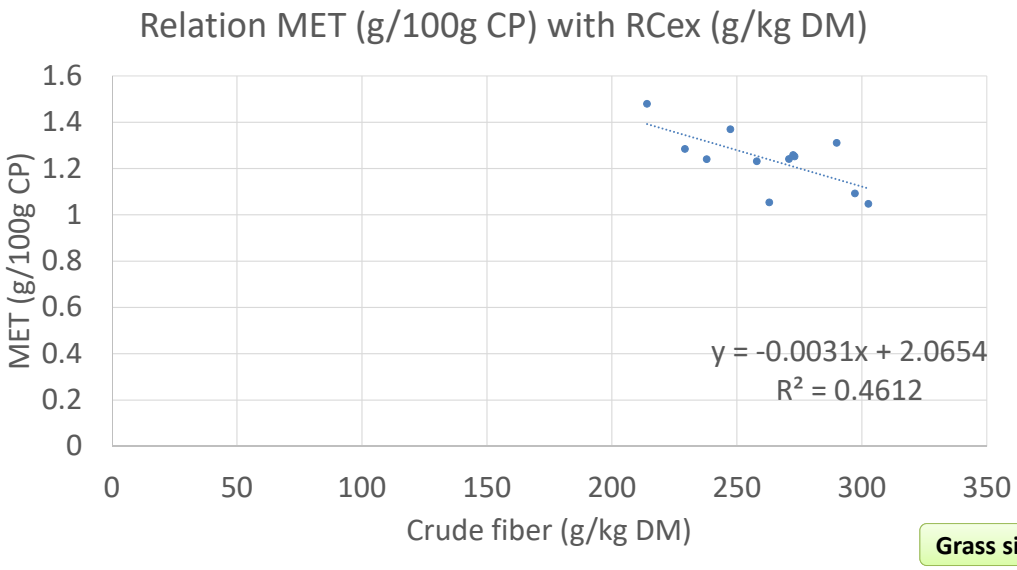
Methionine in grass silages



Grass silages (n=12)

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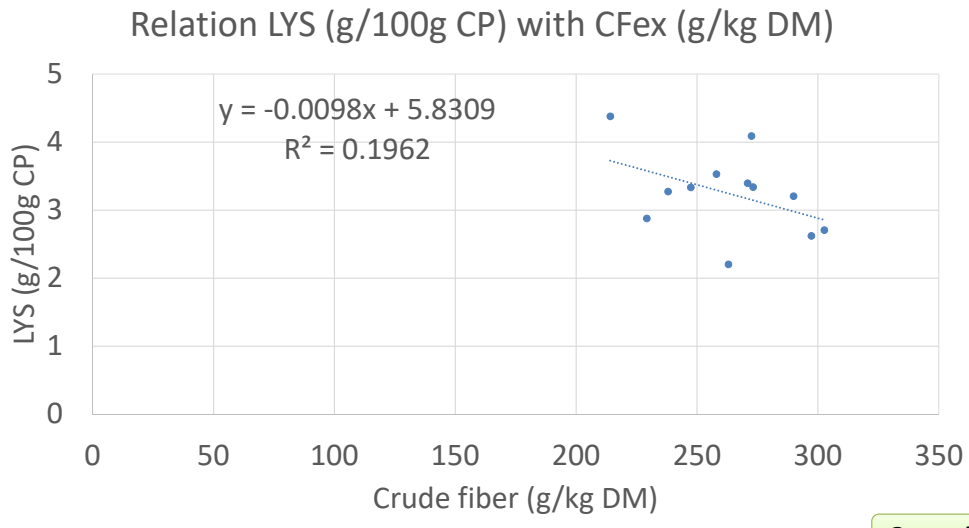
Lysine (g/100g CP) in grass silages



Grass silages (n=12)

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ILVO Study Grass Silages 2019

- The **amino acid profile** in **grass silages** hardly depends on other **silage characteristics**
- The **amino acid profile** (in g/100 g CP) can be assumed **constant** over **different grass silage categories**
- **Amino acid content** of **grass silages** has been **updated** with data of **more recent analyses** (n=12)

ILVO

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Grass silages (n=12)

ILVO Study Maize Silages 2019

- Ten maize silages
- Weende and Van Soest characteristics available
- Rumen degradation and intestinal digestibility was determined in situ (@ILVO)
- Amino acids were determined, except for tyrosine and tryptophan (EC, 1998)

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Maize silages (n=10)

ILVO Study Maize Silages 2019

	Dry Matter	Ash	Crude Protein	Ether Extract	Crude Fiber	Starch	NDF	ADF	ADL
Mean	366	40	73	30	190	360	370	194	16
St. Dev.	41	5	7	4	24	44	32	5	3
Min	304	36	60	24	285	285	336	185	12
Max	429	48	86	34	417	417	429	198	20

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Maize silages (n=10)

ILVO Study Maize Silages 2019

g/100g CP)	ILVO (n=12)	CVB (n=78)
Lysine	2.1 ± 0.4	2.3 ± 0.4
Threonine	3.1 ± 0.2	3.2 ± 0.3
Isoleucine	3.3 ± 0.2	3.3 ± 0.3
Methionine	1.4 ± 0.2	1.5 ± 0.2
Cystine	1.3 ± 0.1	1.3 ± 0.3
Asparaginezuur	5.9 ± 0.6	5.9 ± 0.8
Serine	3.6 ± 0.3	3.7 ± 0.4
Glutaminezuur	12.6 ± 0.9	11.8 ± 1.2
Proline	6.8 ± 0.3	6.2 ± 0.9
Glycine	3.7 ± 0.2	3.9 ± 0.3
Alanine	7.4 ± 0.6	7.6 ± 0.7
Valine	4.6 ± 0.2	4.5 ± 0.3
Leucine	8.7 ± 0.4	8.6 ± 1.0
Phenylalanine	3.8 ± 0.2	3.8 ± 0.5
Histidine	1.6 ± 0.2	1.6 ± 0.3
Arginine	1.9 ± 0.3	1.9 ± 0.4

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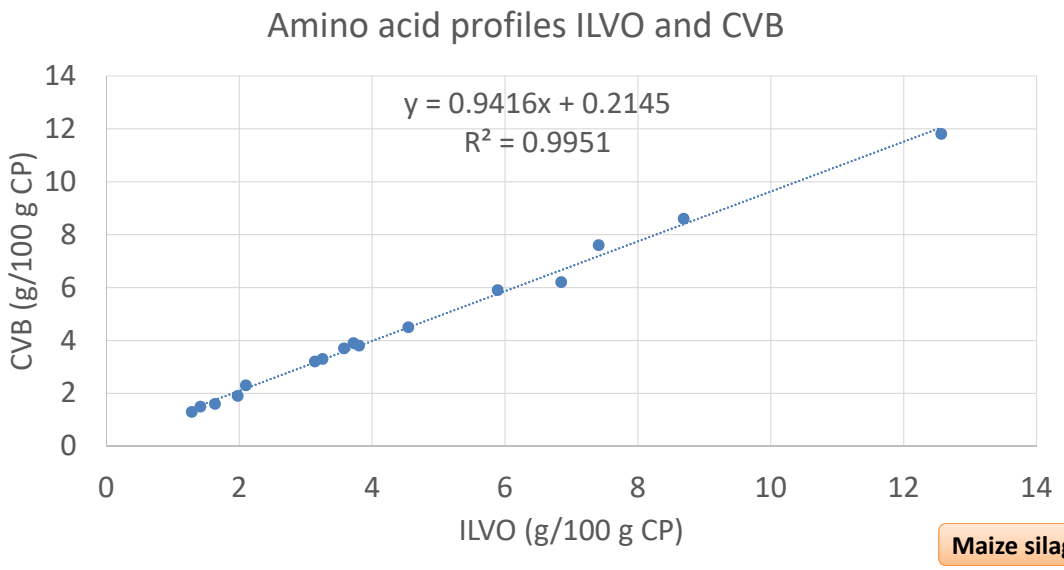
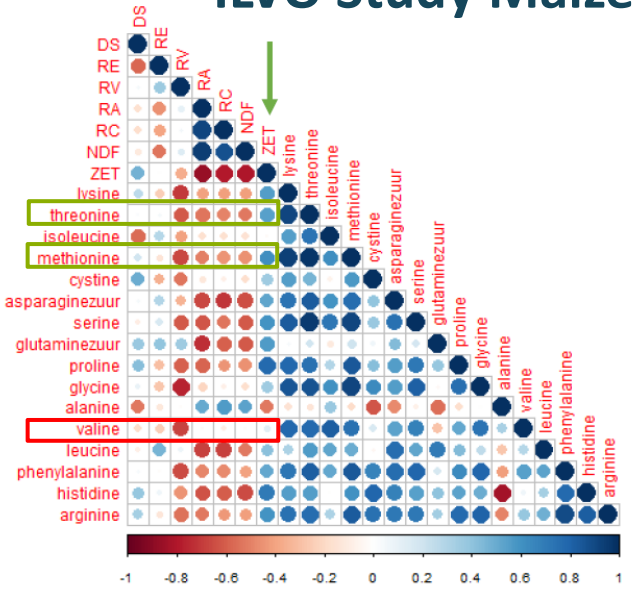
ILVO Study Maize Silages 2019



Maize silages (n=10)

ILVO

ILVO Study Maize Silages 2019



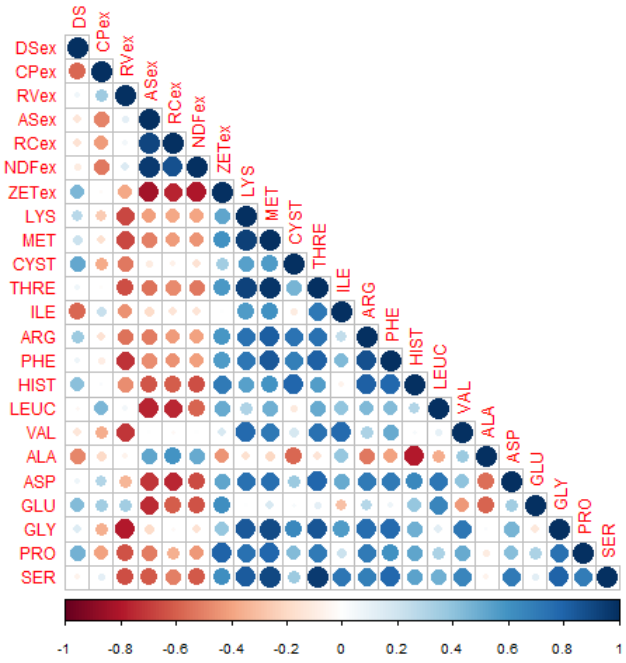
Maize silages (n=10)

Correlation with starch for methionine & threonine

Almost no correlation for cystine

- DS: Dry matter as 100-moisture
- RE: Crude protein without correction for volatile substances
- Amino acid content (in g/100 g CP)

ILVO



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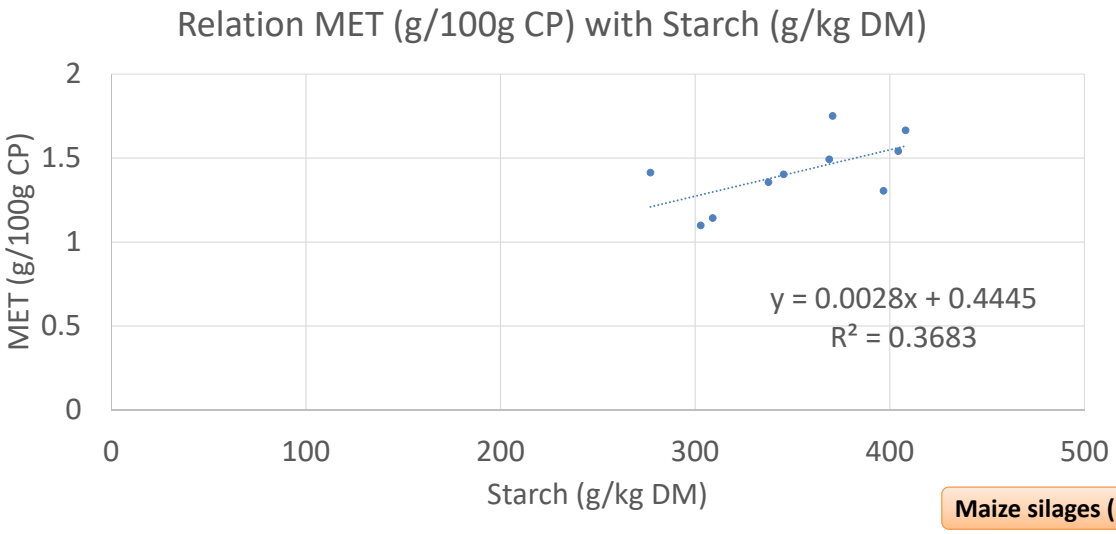
Methionine in maize silages



Maize silages (n=10)

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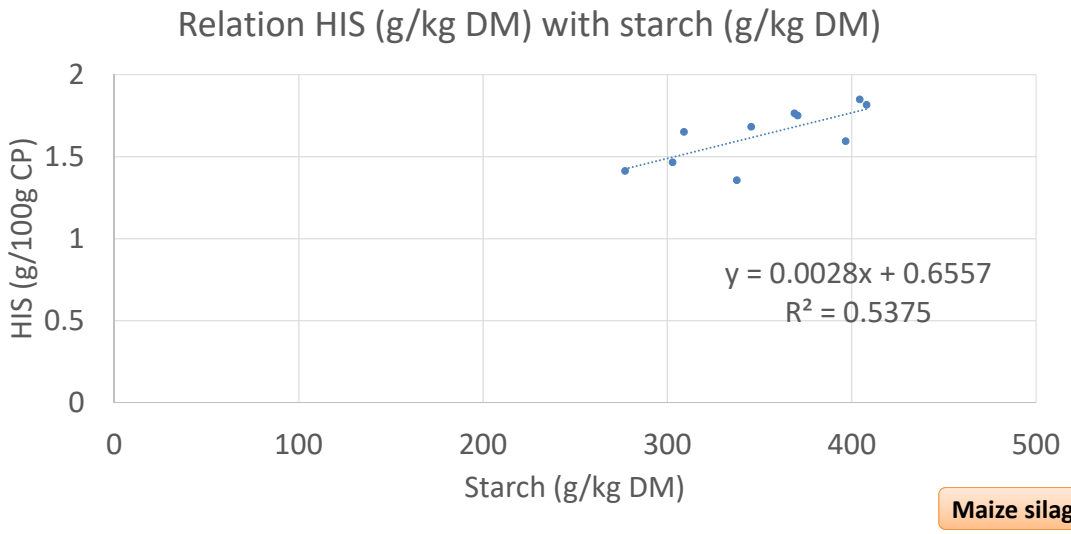
Histidine in maize silages



Maize silages (n=10)

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ILVO Study Grass and Maize Silages 2019

- The **amino acid profile** in **grass and maize silages** hardly depends on other **silage characteristics**
- The **amino acid profile** (in g/100 g CP) can be assumed **constant** over **different grass** and **maize silage categories**
- **Amino acid content** of **grass** and **maize silages** has been **updated** with data of **more recent analyses** (n=12 and n=10)

voor waardevolle voederwaarden

Grass silages (n=12)

Maize silages (n=10)

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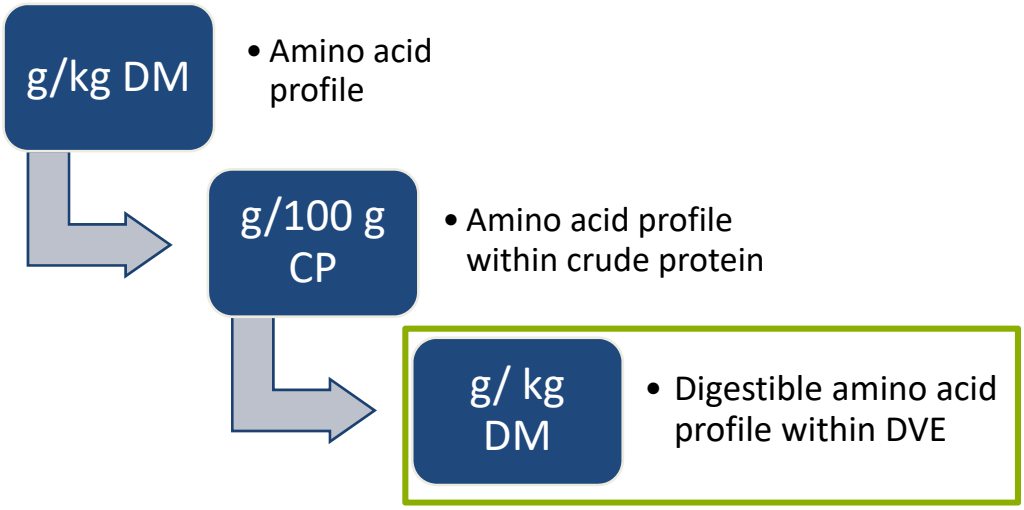
Information in the CVB Table



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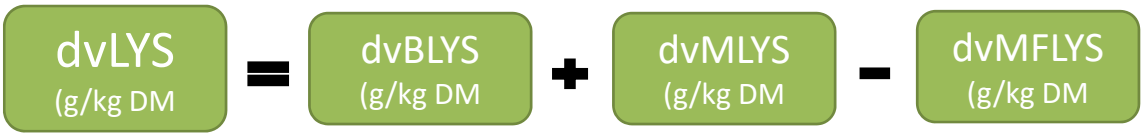
Digestible amino acid profile



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Digestible amino acid profile

dvLYS (g/kg DM) = dvBLYS (g/kg DM) + dvMLYS (g/kg DM) - dvMFLYS (g/kg DM)

$$dvBLYS = \frac{LYS * DVBE}{100\ (g\ DVE)}$$

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Voor methionine => * 1,042 wegens hogere absorptie-efficiëntie van methionine

Digestible amino acid profile

dvLYS (g/kg DM) = dvBLYS (g/kg DM) + dvMLYS (g/kg DM) - dvMFLYS (g/kg DM)

$$dvMLYS = 0{,}077 * DVME$$

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Voor methionine => factor 0,025

Van Duinkerken and Blok, 1998

Digestible amino acid profile

dvLYS (g/kg DM) = dvBLYS (g/kg DM) + dvMLYS (g/kg DM) - dvMFLYS (g/kg DM)

dvMFLYS = 0,057 * DVMFE

Voor methionine => factor 0,015

Van Duinkerken and Blok, 1998

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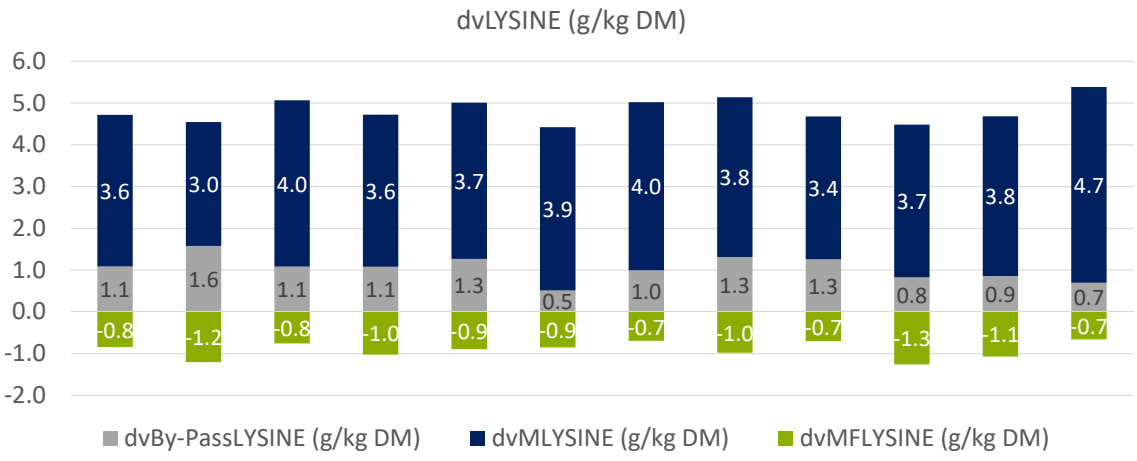
Variation in digestible lysine in grass silages



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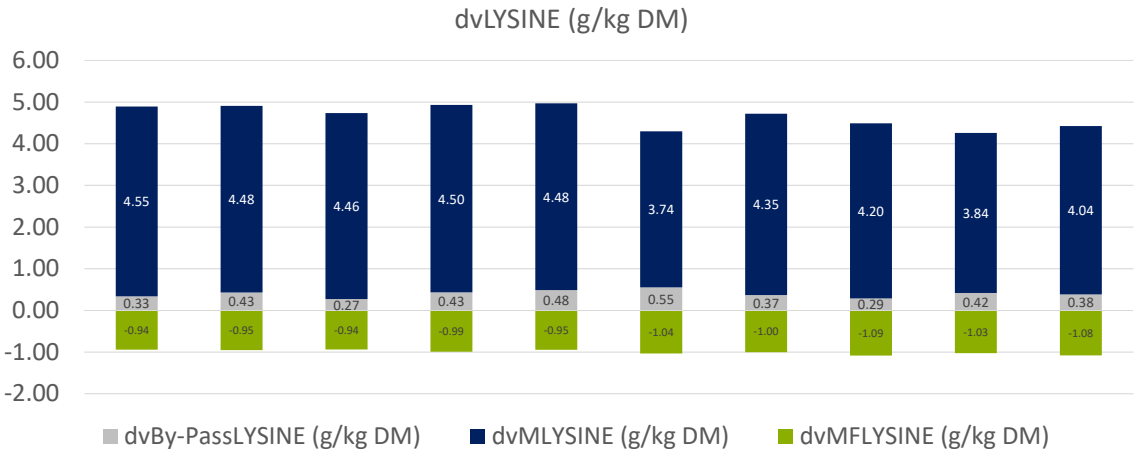
Variation in digestible lysine in maize silages



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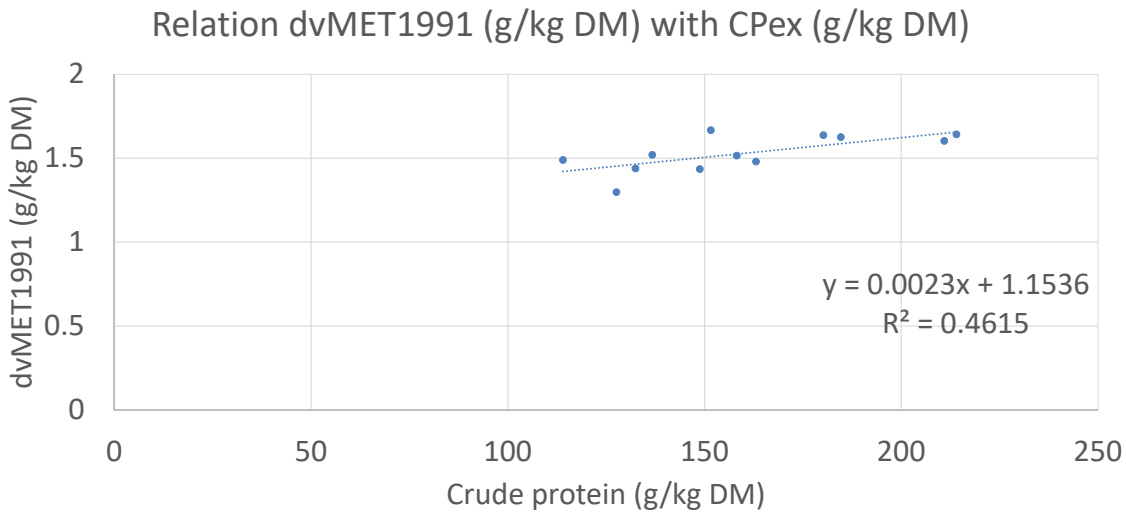
Digestible methionine in grass silages



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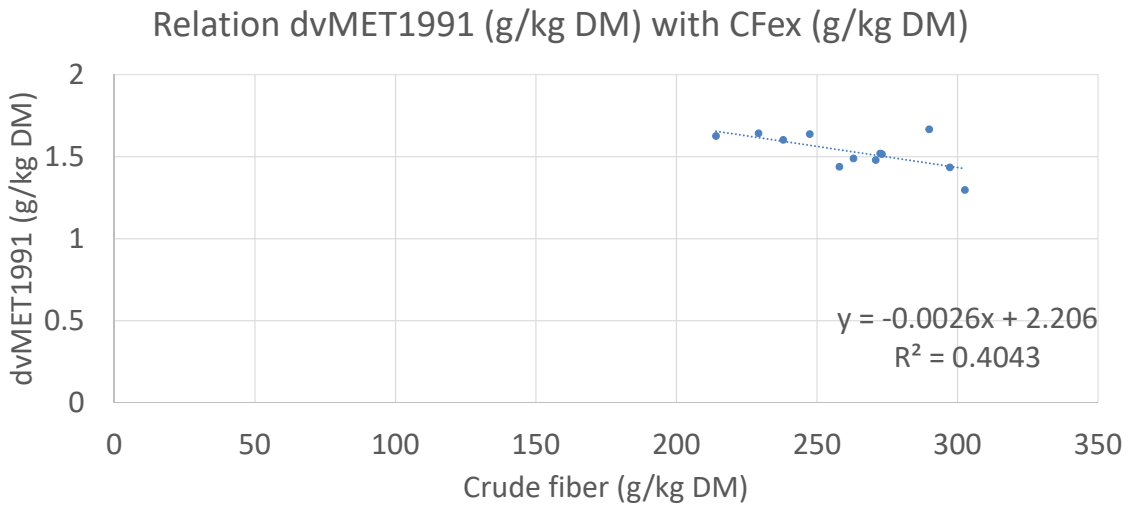
Digestible methionine in grass silages



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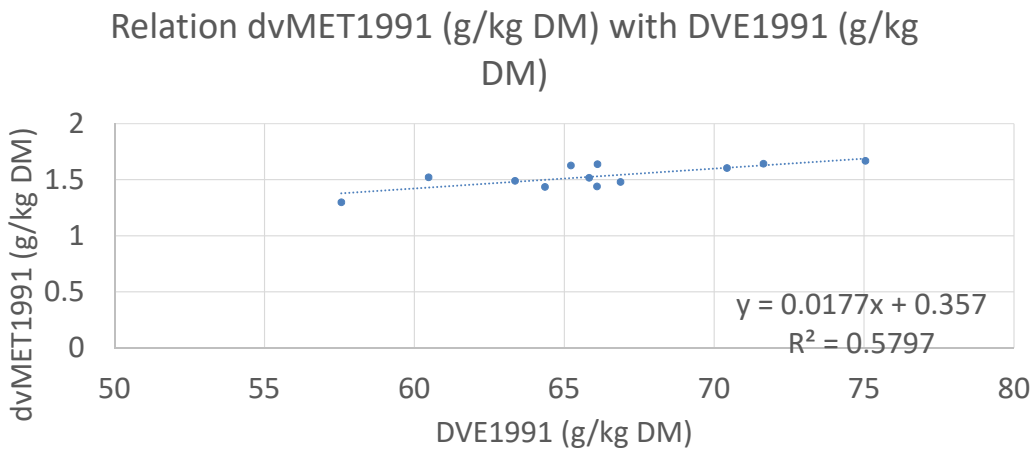
Digestible methionine in grass silages



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Conclusions

- The **amino acid profile** in **grass and maize silages** hardly depends on other **silage characteristics**
- The **amino acid profile** (in g/100 g CP) can be assumed **constant** over **different grass silage categories**
- **Amino acid content** of **grass silages** has been **updated** with data of **more recent analyses** (n=12 and n=10)
- Optimizing **grass quality** remains utmost important

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Dank u wel

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