Systool Web: a new on-line application for the French INRA "Systali" project

P. Chapoutot, O. Martin, P. Nozière and D. Sauvant

patrick.chapoutot@agroparistech.fr
Outline of the presentation

• The French INRA "Systali" project
• Organization of Systool Web
  – Objectives of Systool Web
  – Pedagogical module
  – Calculation module
• Some illustrations
• Conclusions
The Systali project
The "Systali" project

= A renovation of the INRA feed unit system

- To predict more precisely:
  1. The NE (UFL), MP (PDI), AA supplies & the flows of other nutrients (VFA, Gas, Glucose, Fatty Acids)
  2. The animal requirements & their responses to NE, PDI & other nutrients

- To enlarge the fields of application of the feed unit systems (→ hot countries, intensive diets...)

Already published (2013 & 2015)

Still in progress
The INRA "Systali" nutrient supply model

- Prediction of the flows of diet nutrients
- More precise description of Digestive Interactions:

\[ \text{Value(diet)} = \sum_j p_j \times \text{Table_value(feed)}_j \pm DI \]

- Modelling approach of DI:
  
  → Major impact on OM digestibility
  
  **3 Causes:**
  - Feeding level (DMI % BW)
  - Prop of concentrate (0< <1)
  - Rumen Protein Balance (=CP intake – CP duodenum)
• Other processes impacted by the 3 factors of DI:
  - NDF digestibility & Rumen Fermented OM (FOM)
  - Protein and Starch digestive partition (through transit rate)
  - CH4 production
  - Urinary E & N losses

• Rumen Protein Balance (ration)  
  \[ RPB = f(PDIME, PDIMN) \]  
  \[ \begin{align*}
  \text{Input data (→ DI)} \\
  \text{Output data}
  \end{align*} \]

  => Iterative process of calculation

→ More complex calculations
→ Computer calculations needed
Organisation of Systool Web
Objectives of Systool Web
Objectives of Systool Web

Due to strong demand from users & professionals

- To obtain further explanations about the new concepts
- To practice the use of the new calculation models
- To integrate all the new equations in their own tools

A simple & powerful tool, quickly implemented (3 months) & funded by AFZ, with 2 main objectives:

- A pleasant e-learning tool for the nutrient supply model
- An efficient computation tool for feed & ration values
Pedagogical module
• 2 sub-models: the "Feed model" & the "Ration model"

• Variables gathered in different areas
  ➔ energy, nitrogen, cell-wall, starch, fatty acids...

• Representation of the chaining variables according to the equations of the models:
  ➔ Neighboring-, predecessor-, or successor-diagrams

• Detailed description of all the equations of the models

• Graphs of the main relationships between variables
Predecessors of feed Omd?
Successors of diet RPB?
Approach & Organisation of calculations

• Equations applied to estimate the Feed values:
  → "Table" values of feeds, without Digestive Interactions (FL=ref)
  → "Diet" values of feeds, with DI (FL, PCO & RPB of actual ration)
  ==> iterative process of calculation

• Additivity calculation used to obtain the Ration values:
  → "Systali" values of the diets

• Calculation of the Nutrient flows from the ration values

• Deliberately light structure of data:
  → Simple organisation of the Input variables (Rations, Feeds, User Table)
  → No interpretation/transformation of the output variables (self-interpretation by users)
What can you do with all these data?

Just use your brain...
...and add your own touch!
Comparison of OM digestibility of rations
"Systali" vs "2007"

Source: J-B. Daniel (MosarCo Data base)

OMd "Systali" (%) vs OMd "2007" (%)

Y = 12.8 + 0.71 X (n=1185, R²=0.54, RSD=1.95)

Dairy cows

Without DI

OMd "2007" (%)
Influence of FL & PCO on the differences Systali - 2007 of Net Energy ration values

26 diets from experimental farms (Grazing- & Maize silage based) (Source: Idele data)

Influence of FL

Grazing based diets (+Maize Sil./Grass Sil.)

Maize silage based diets (+Grazing/Grass Sil./Hay)

Influence of PCO

Grazing based diets (+Maize Sil./Grass Sil.)

Maize silage based diets (+Grazing/Grass Sil./Hay)
Conclusion
A user-friendly & powerful app

• A synthesis of all the equations of the nutrient supply model
• A simple & illustrative representation of the chaining variables
• A very efficient tool \(\rightarrow\) light-speed calculations: only 15-20 sec. for 600 rations including 6000 feeds!

• Systool web currently in French...
  ...but an English version available very soon!

• Future evolutions:
  – Short-term: Updates with the evolutions of the Systali models
  – Later: Comparisons of INRA Systali & international systems...
And right now?

Why don't you try it?

→ www.systool.fr
  
  login: user01, user02, ... , user09, user10
  
  password: EAAP2015

> even on your smartphones!

You can use it for free...

...until the end of the meeting!

Try it, enjoy... and adopt it!
Thank you for your attention!