

Redefining the formula for feed conversion ratio in pigs through participatory research



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Feed conversion ratio (FCR)

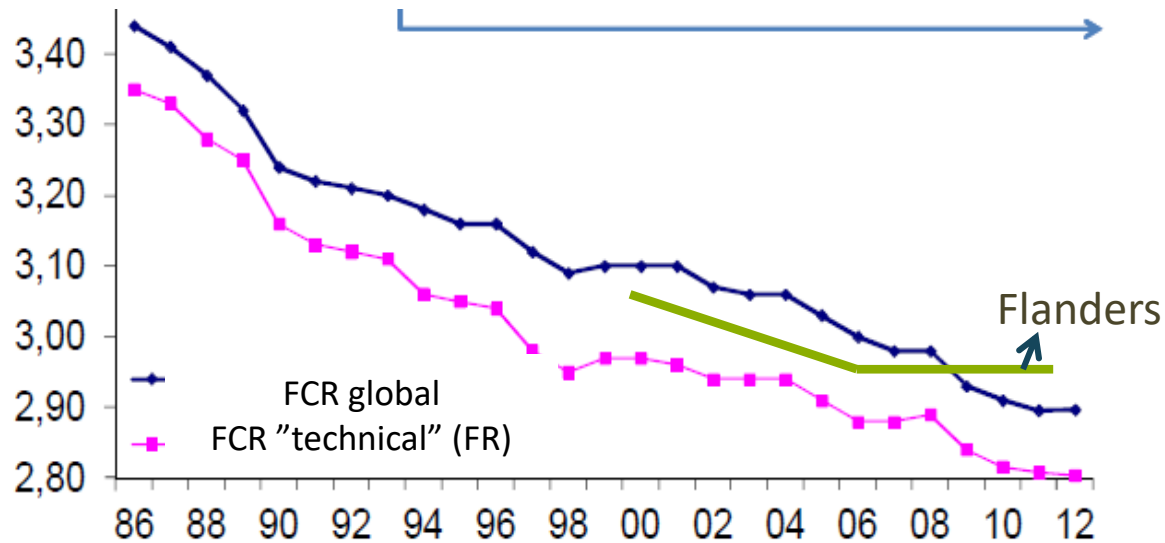
- Feed: 60% - 75% of total cost for pork production
- 75% of feed is consumed during finishing period
- important determinant of farm profitability and production efficiency



FCR: situation in Flanders

Evolution feed conversion ratio in Flanders

2000	2007	2010	2011	2012	2013
3,08	2,93	2,90	2,92	2,95	2,94



FCR: formula

- Simplest form:
$$FCR = \frac{\textit{kg feed consumed}}{\textit{1kg gain weight of live animal}}$$
- Problems:
 - Influencing factors?
 - Data availability
 - Scope
 - Economical? metric that is used to measure feed efficiency. Low FCR values result in relatively high pork prices as a result of elevated feeding costs. Increasing the FCR of commercial pigs thus represents an important strategy for minimizing swine production costs.
 - Technical?
 - Conceptual problem:
 - Various definitions
 - “less is more” confusion

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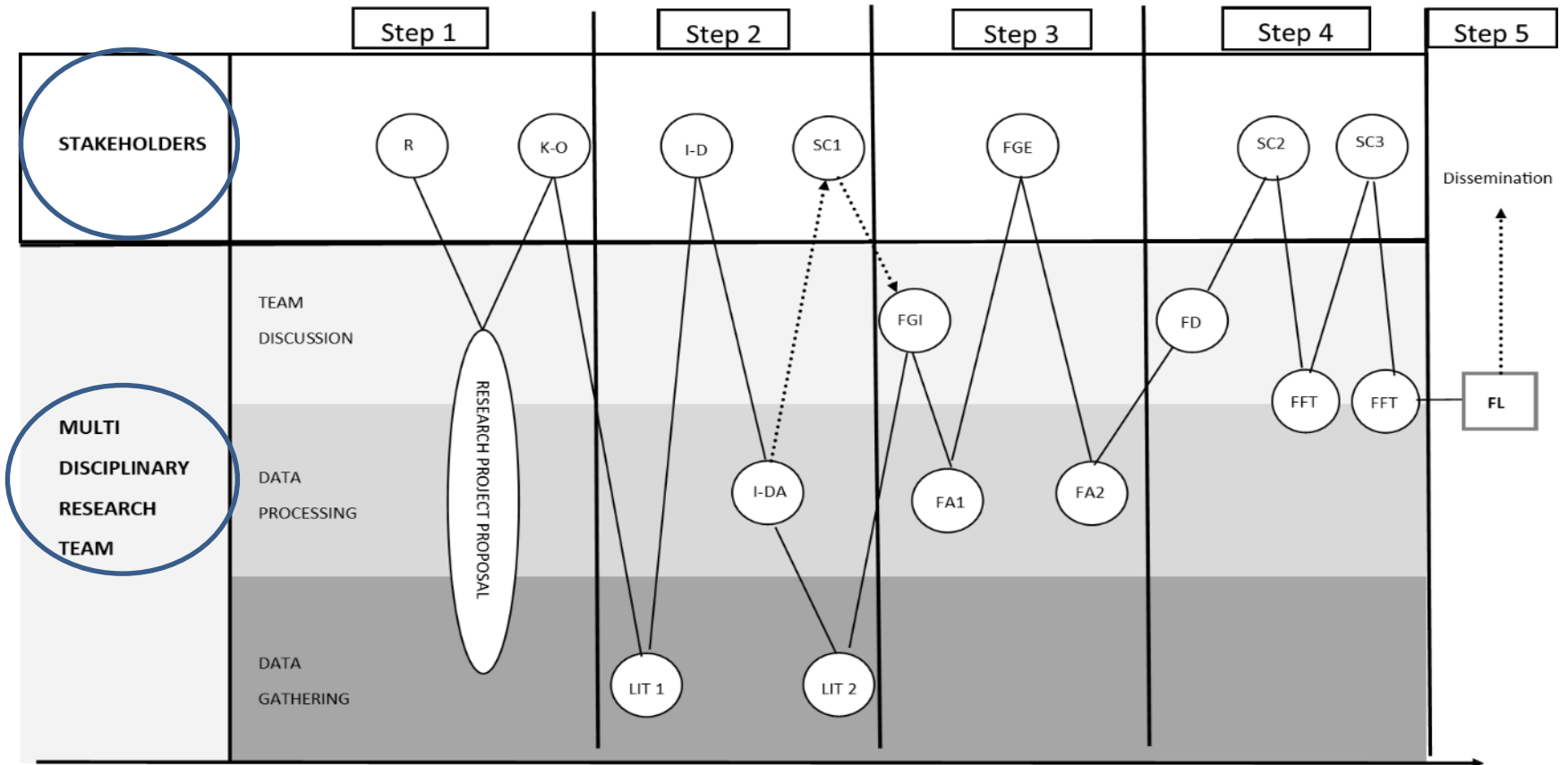
FCR: formula

Goal : to optimize the calculation of FCR through the use of participatory qualitative research

❖ One formula?



Participatory research process



R: Request for uniform formula to determine feed conversion in pigs

K-O: Kick-off meeting of research project

LIT: Literature review

I-D: In-depth interviews

I-DA: Analysis of in-depth interview results

FGI: Focus group internal

FA: Focus group analysis

FGE: Focus group external

FD: Formula design

SC: Steering committee

FFT: Formula fine tuning

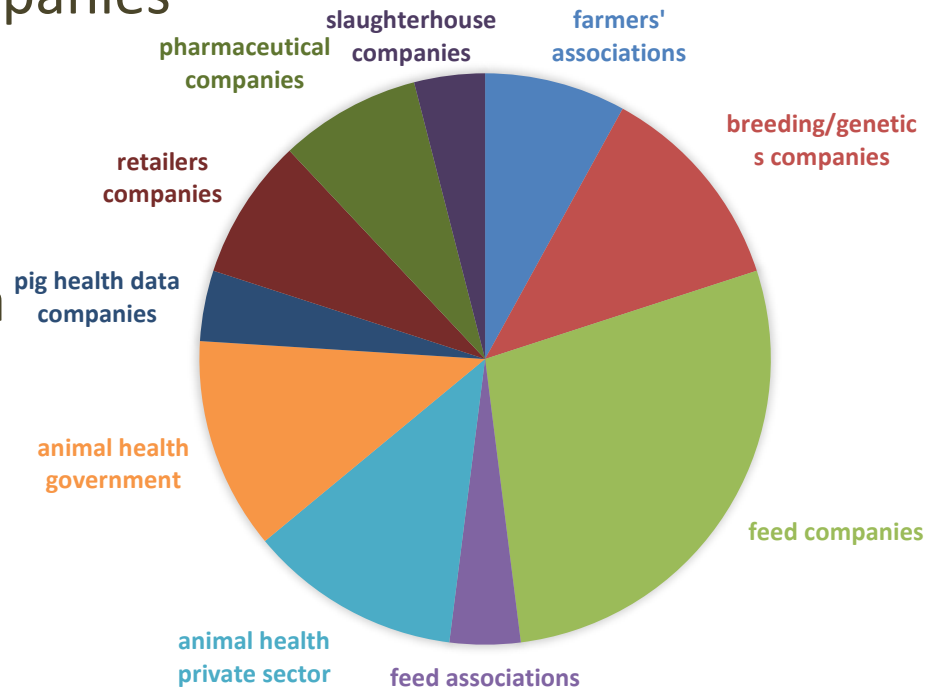
FL: Formula launch

Participants

Stakeholders



- ✓ Primary sector
- ✓ Feed companies
- ✓ Genetics
- ✓ Retailers
- ✓ Pharma
- ✓ Academia
- ✓ Advisers



Participants



Research team

- ✓ Animal science experts
- ✓ Veterinarians
- ✓ Agro economists

Results: deep interviews

- a) Various definitions for feed conversion
- b) Various calculating methods per definition
- c) Bottlenecks for uniform methodology/formula

- Examples of formulas in use in Flanders:
 - Bruto (commercial)
 - Netto (economical)
 - Gecorrigeerd (corrected)
 - Standardized (Formule AKKV* Departement landbouw en visserij)
 - EW conversion ratio

*Afdeling Kennis, Kwaliteit en Visserij

Results: Internal and external focus groups

Feed conversion ratio formula has to serve a two-fold goal

- As an “economical” indicator
 - Important for pig farmer
 - Performance of farm
- As a “technical” indicator
 - Important for follow up
 - Important for use in comparisons:
 - Of production rounds within a farm
 - Between different farms

Results: formulas design and launch

2 formulas, 2 functions

1. Carcass gain per kg feed (CGF)
 - not standardized
 - ✓ Follow up own farm

2. Standardized carcass gain per kg feed (CGF_{standardized})
 - correction for mortality
 - standardization of weight trajectory
 - ✓ enables comparisons between farms

Carcass gain per kg feed (CGF)

$$= \frac{\text{nr delivered pigs} \times \text{final weight}_{\text{warm carcass}} - \text{nr delivered piglets} \times \text{initial weight} \times \text{piglet carcass yield}}{\text{feed consumption}}$$

Warm carcass = cold carcass x 0.98

Warm or cold carcass weight can objectively be asked at the slaughterhouse

❖ Why focus on warm carcass?

- ✓ Warm carcass weight data availability in most lands

Interpig data and result for 2015

	Austria	Belgium	Brazil (MT)	Brazil (SC)	Canada	Denmark	Denmark33	Finland	France	France33	Germany	Great Brit	Ireland	Italy	Netherland	Spain	Sweden	USA
Productie-efficiëntie																		
Slachtegewicht: levend, warm of koud	Hot	Hot	Live	Hot	Hot	Hot	Hot	Hot	Hot	Hot	Hot	Hot	Cold	Cold	Hot	Hot	Hot	Hot

Standardized carcass gain per kg feed (CGF_{standardized})

- 4 steps to correct for mortality:
 - Calculate daily chance to die
 - Calculate average days present per pig
 - Calculate corrected feed intake
 - Calculate carcass gain per kg feed intake corrected for mortality
- 3 steps to standardize for weight trajectory
 - Standardize CGF for initial weight
 - Assign a correction factor
 - Standardize for a weight trajectory of 25 kg to 115 kg (live weight)



https://varkensloket.be/tools/karkasgroei

Webtool for the new formulas (CGF)



https://varkensloket.be/tools/karkasgroei

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VARKENSLOKET

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Home / Rekenmodules / Bereken de karkasgroei per kg verbruikt voeder

Binnen het VLAIO-project "Naar een bedrijfseconomische en milieukundige win-win door een efficiënt voedergebruik in de varkenshouderij" wordt onderzocht hoe we naar een algemeen aanvaarde formule voor de berekening van de voederconversie kunnen gaan. Na overleg met verschillende stakeholders uit de sector kwam een nieuw kengetal naar boven, namelijk de karkasgroei per kg voeder. Via onderstaande tool kan u de karkasgroei per kg voeder berekenen.

Opleggewicht biggen (kg)	<input type="text" value="23"/>
Aantal opgelegde biggen	<input type="text" value="200"/>
Aantal afgeleverde varkens	<input type="text" value="196"/>
Hoeveelheid verbruikt voeder (kg)	<input type="text" value="50000"/>
Afmestduur (dagen)	<input type="text" value="138"/>
Karkasgewicht (kg)	<input checked="" type="radio"/> Koud <input type="radio"/> Warm <input type="text" value="90"/>
Karkasgroei per kg voeder	<input type="text" value="0,292"/>
Gestandaardiseerde karkasgroei per kg voeder*	<input type="text" value="0,291"/>

* gecorrigeerd voor sterfte en representatief voor een gewichtstraject 25-115 kg (levend gewicht)

Naast bovenstaande rekenmodule bieden we ook een [rekenmodule voor de berekening van de gestandaardiseerde voederconversie](#) aan.

Thank you for your attention!

Co financed by:



CGF standardized

Step	Calculating formula
I. Calculate daily chance to die	$P_{\frac{\text{mortality}}{\text{day}}} = 1 - \sqrt[fattening\ round\ duration]{1 - mortality}$
II. Calculate average days present per pig	$average\ nr\ days\ present = \sum_{i=1}^{fattening\ round\ duration} \left((1 - P_{\frac{\text{mortality}}{\text{day}}})^i \right)$
III. Calculate corrected feed intake	$Corrected\ feed\ intake\ per\ delivered\ (fattened)\ pig = \frac{Total\ feed\ intake}{nr\ delivered\ pigs} * \frac{average\ nr\ days\ present}{fattening\ round\ duration}$
IV. Calculate carcass growth per kg feed intake (CGF) corrected for mortality	$CGF_{mortality} = \frac{corrected\ feed\ intake\ per\ delivered\ pig}{final\ weight_{warm\ carcass} - initial\ weight * piglet\ carcass\ yield}$
V. Standardize CGF for initial weight	$CGF_{st.in.} = \frac{CGF_{mortality} * (final\ weight_{warm\ carcass} - initial\ weight) - CGF_{for\ 25kg\ liveweight}^1 * (standardized\ initial\ weight - initial\ weight)}{final\ weight_{warm\ carcass} - standardized\ initial\ weight}$
VI. Assign a correction factor	$correction\ factor = \frac{(CGF_{st.in.} - CGF_{for\ a\ 25kg\ liveweight})}{final\ weight_{warm\ carcass} - standardized\ initial\ weight}$
VII. Standardize for a weight trajectory of 25kg to 115kg (live weight)	$CGF_{standardized} = CGF_{st.in.} - (correction\ factor * (final\ weight_{warm\ carcass} - standardized\ final\ weight_{warm\ carcass}))$