Wallonie recherche CRA-W

Centre wallon de Recherches agronomiques

# Estimation of protein autonomy of livestock farming in Wallonia – *with a focus on dairy farming*

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# Introduction

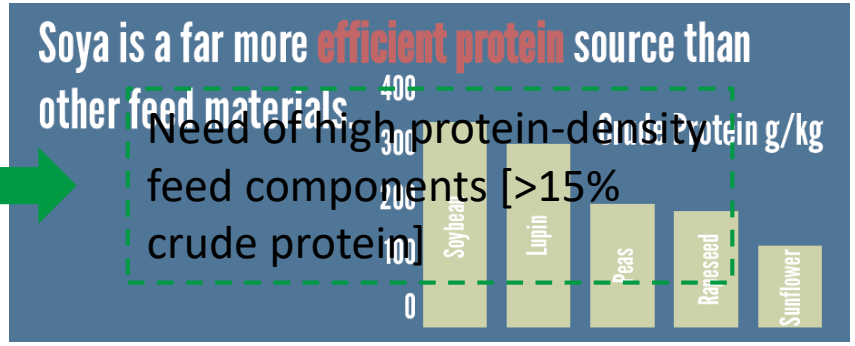
## Protein autonomy, why is it a thing ?

## Dependance

### In Europe

1


1




2

| | |
|---|---|
| EU vegetal protein needs | 27 millions tons |
| EU vegetal protein imports | 17 millions tons |

1


2 EU soybean-protein imports : 13 millions tons

Autonomy = around 63%



1 (MVO, 2015)
2 (Rosario et Robin, 2018)

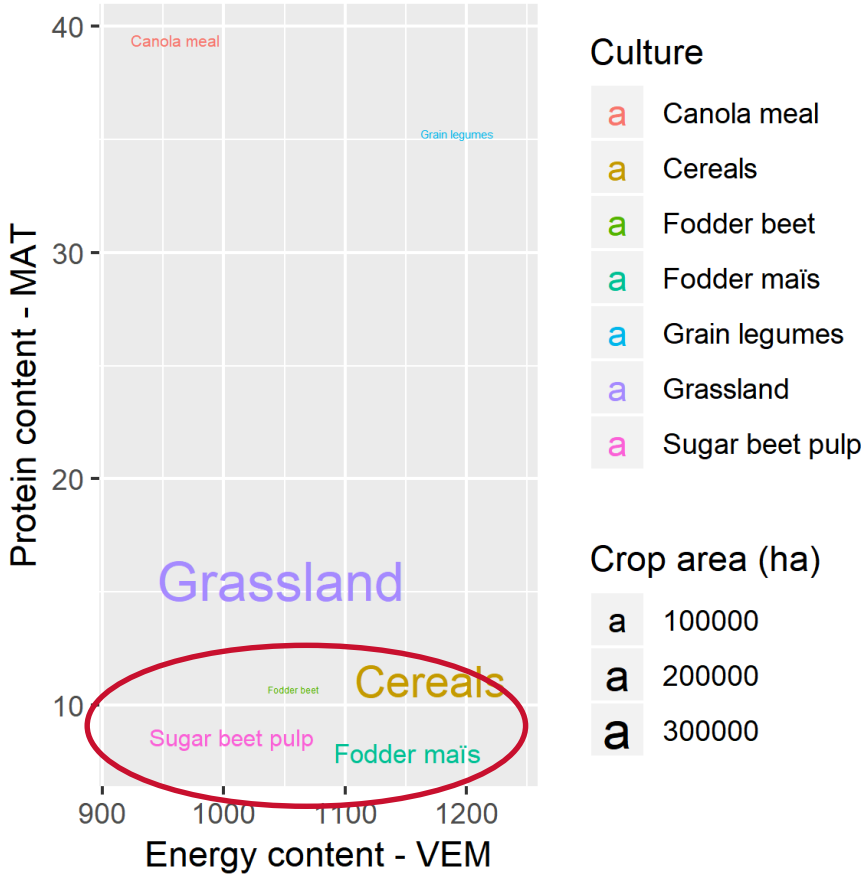
# Introduction

## Protein autonomy, why is it a thing ?

Dependance

In Wallonia

Produced crops in Wallonia for the years 2014/15/16 [3]




Produced crops are mostly energy-rich



[3] (Statbel, 2014 ; 2015 ; 2016)

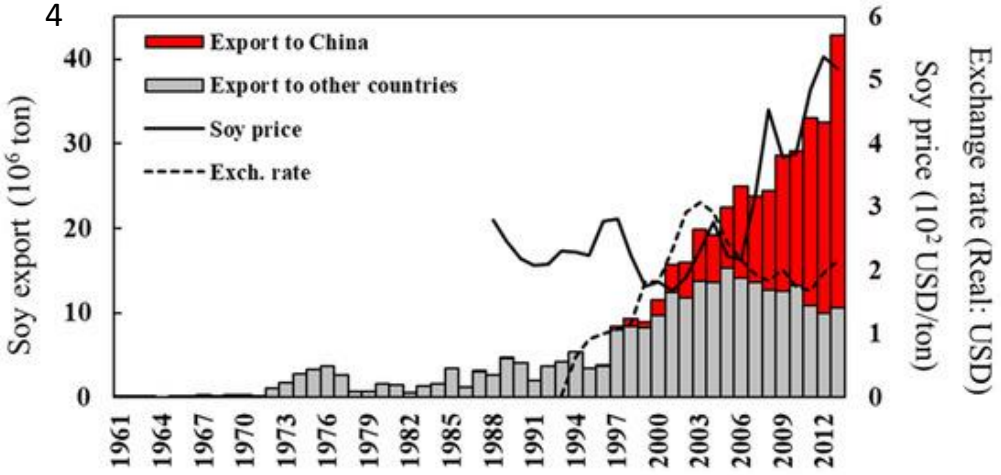
# Introduction

Proteic autonomy, why is it a thing ?

## Dependance + Instability

1 China's share in global soybean imports increased from 0% to more than 60% in the period 1995-2014 while the EU's share decreased from 49% to 12% in the same period.


4






[1] (MVO, 2015)
[4] (Martinelli et al., 2017)

# Introduction

Proteic autonomy, why is it a thing ?

Dependance + Instability → Vulnerability

# Introduction

## The necessity to find solutions

Interreg
EUROPEAN UNION
Grande Région | Großregion
AUTOPROT
Fonds européen de développement régional | Europäischer Fonds für regionale Entwicklung

*Increasing the competitiveness of dairy farms in the Greater Region by improving their protein autonomy*

Luxembourg – France – Belgium - Germany

- Calculations of protein autonomy and environmental and economic parameters at farm level
- Assessment of protein autonomy at regional level
- Identification of innovations to improve protein autonomy
- Cross-border exchange groups
- Modeling innovations and estimating the gain in protein autonomy

# Introduction

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Calculations of protein autonomy and environmental and economic parameters at farm level

**Assessment of protein autonomy at regional level**

Identification of innovations to improve protein autonomy

Cross-border exchange groups

Modeling innovations and estimating the gain in protein autonomy

# Methodology - defining autonomy

How do we consider productions ?

$$\textit{Regional protein autonomy:} \frac{\textit{Regional protein productions}}{\textit{Regional protein needs}}$$

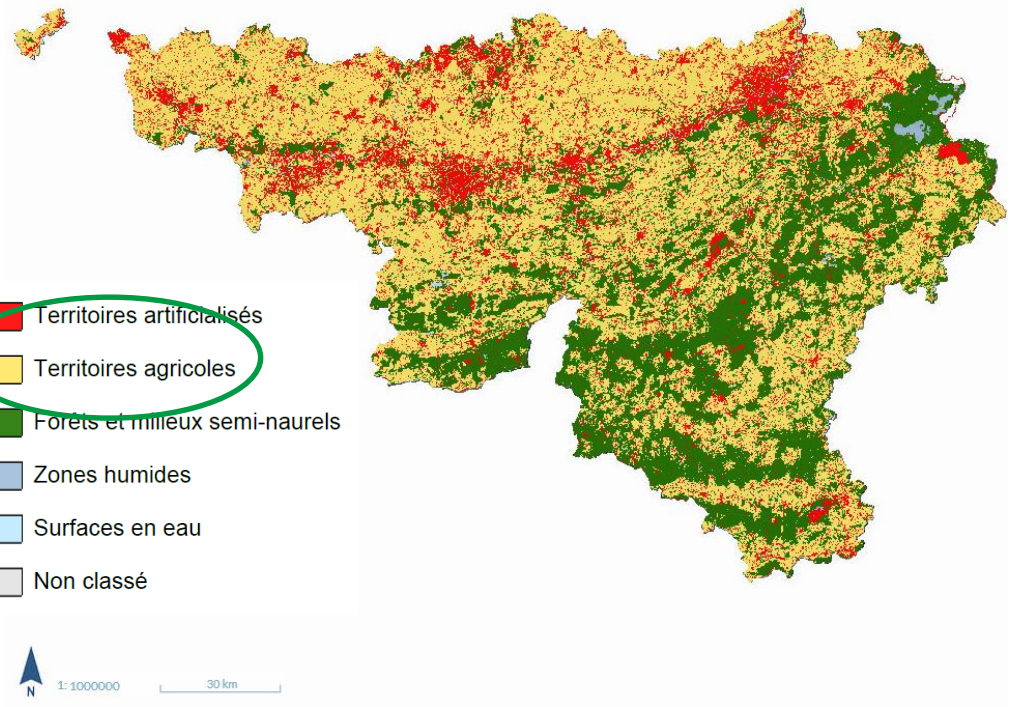
How do we consider needs ?

→ Three-year average (2014-2015-2016) to avoid yield variations

# Methodology - Productions

## Considering the production of agricultural areas

Agricultural Areas →




Agricultural map of Wallonia [5]

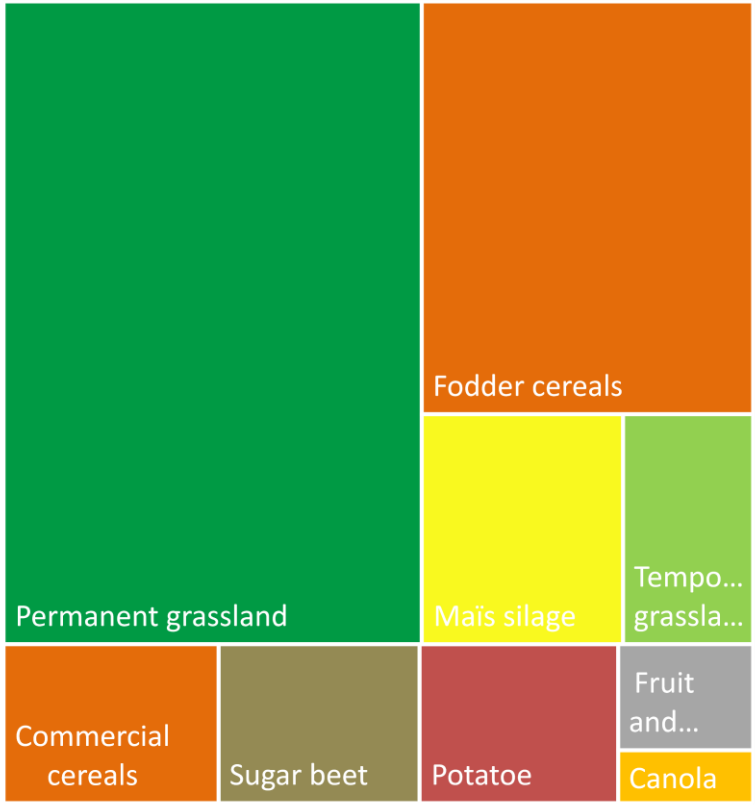


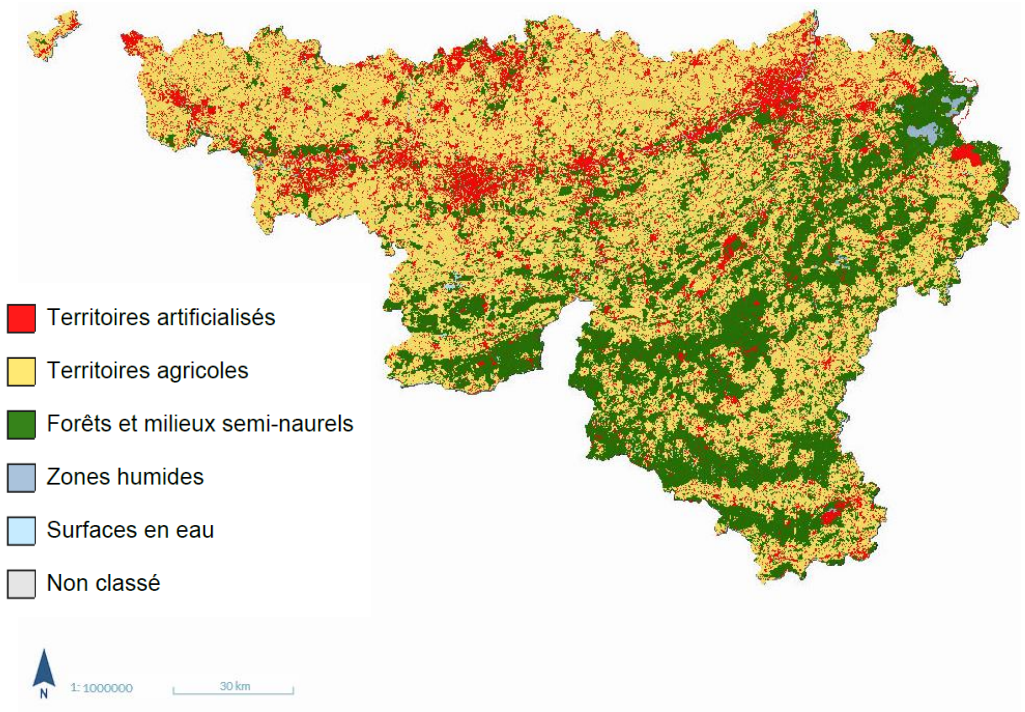
[5] (WalOnMap, 2018)

# Methodology - Productions

## Considering the production of agricultural areas

Walloon agricultural area (ha) [3]



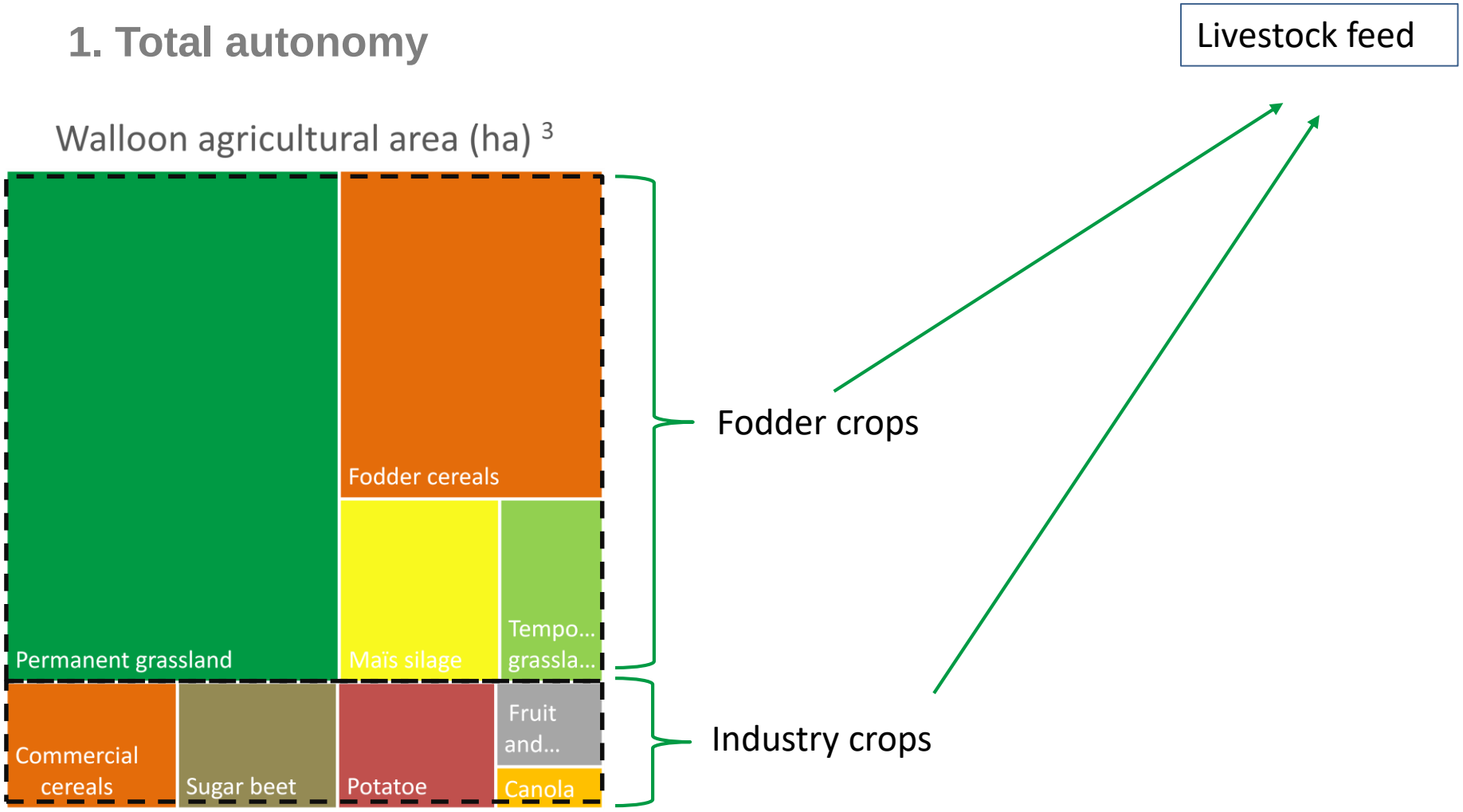

Agricultural map of Wallonia [5]



[5] (WalOnMap, 2018)
[3] (Statbel, 2014 ; 2015 ; 2016)

# Methodology - Production

## 1. Total autonomy

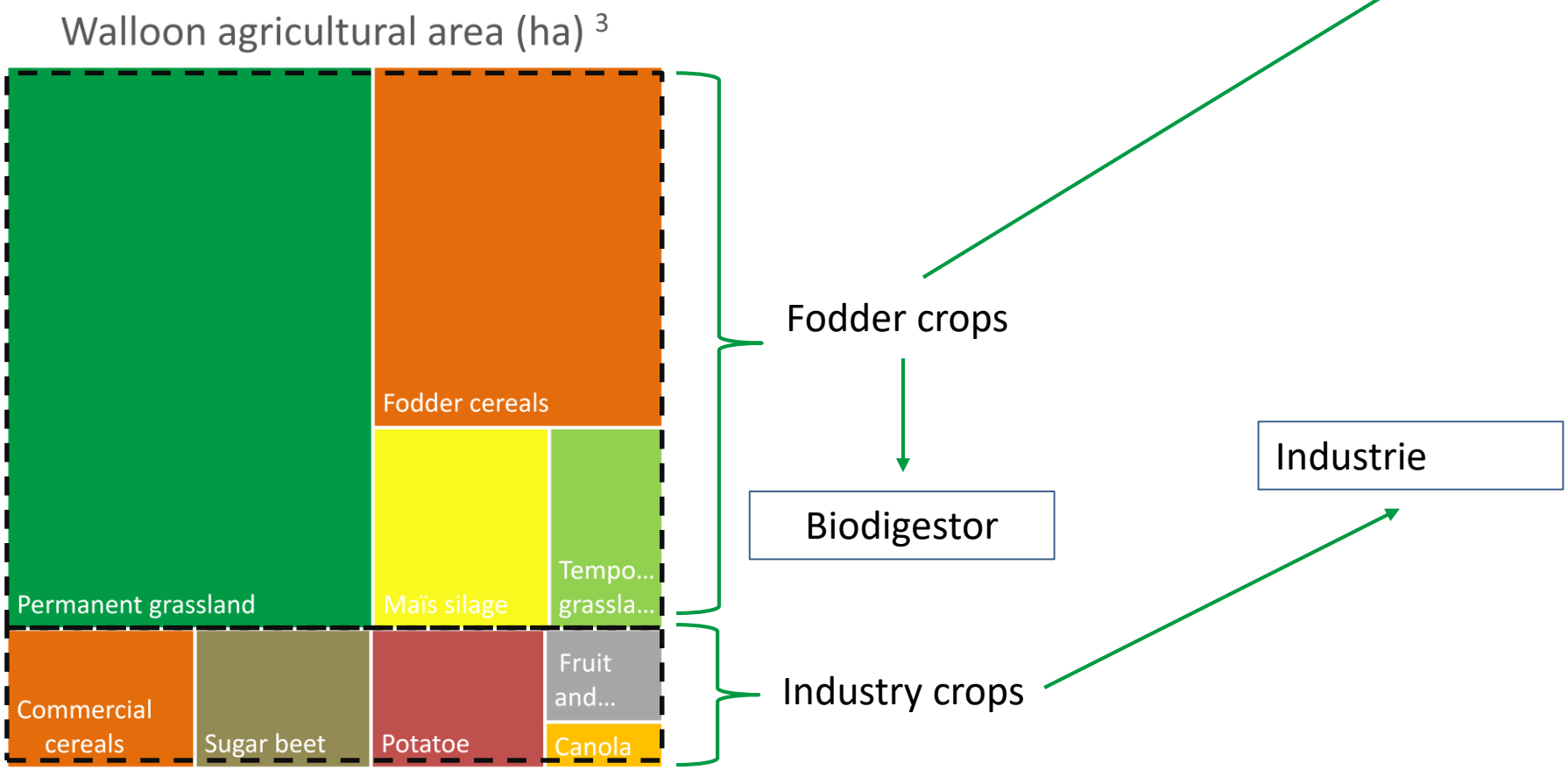





[3] (Statbel, 2014 ; 2015 ; 2016)

# Methodology - Production

## 2. Fodder autonomy

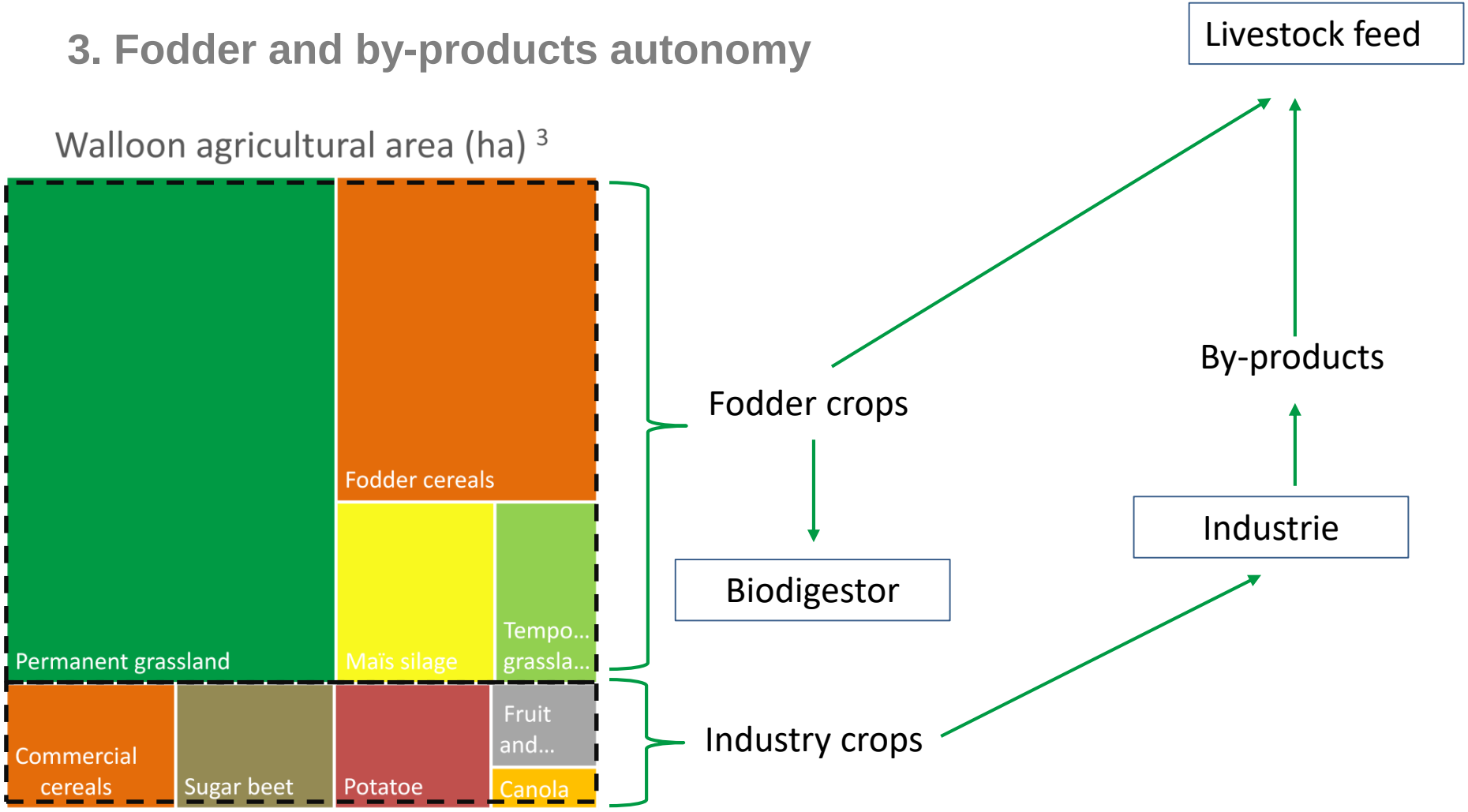





[3] (Statbel, 2014 ; 2015 ; 2016)

# Methodology - Production

## 3. Fodder and by-products autonomy

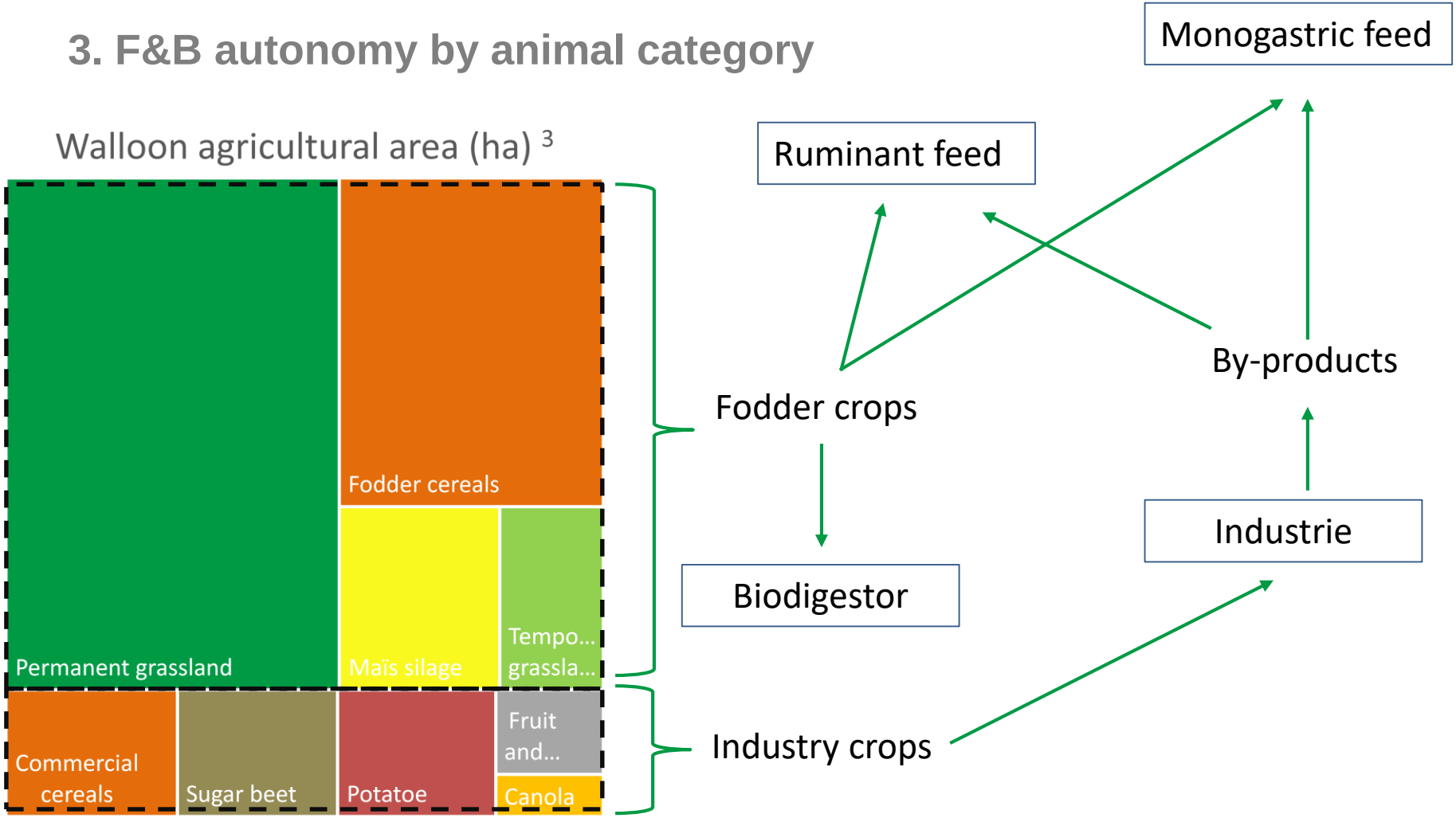





[3] (Statbel, 2014 ; 2015 ; 2016)

# Methodology - Production

## 3. F&B autonomy by animal category






[3] (Statbel, 2014 ; 2015 ; 2016)

# Methodology - Livestock needs

## Considering the needs of our local livestock

$$Total\ needs : \sum_{Animal\ category} Protein\ needs * Number\ of\ animals$$

Theoritical formulas

National statistics

$$High\ protein\ density\ needs : \sum_{Animal\ category} High\ protein\ density\ needs\ * Nbr\ of\ animals$$

Detailed estimation made for dairy cows

# Methodology - Livestock needs

## Estimation of high-protein component from dairy cows'diet

Approaching dairy cows' diet with agricultural region specific diet types

1. Evaluation of the fodder composition based on the agricultural utilisation of the region (grass/maize ratio)


2. Complemention to obtain a balanced diet and reach mean milk production

Expert panel was composed of:

- Nutrionnists
- Feed merchants
- Scientists
- Technical staff

# Methodology - defining autonomy

## Our approach

1. Total autonomy

$$Total\ \ autonomy: \frac{Total\ protein\ production}{Total\ protein\ needs}$$

2. Fodder autonomy

$$Fodder\ autonomy: \frac{Fodder\ protein\ production}{Total\ protein\ needs}$$

3. Fodder autonomy and by-products

$$Fodder\ autonomy: \frac{Fodder\ and\ by-products\ protein\ production}{Total\ protein\ needs}$$

3.1. Ruminant specification

3.2. Monogastrics specification

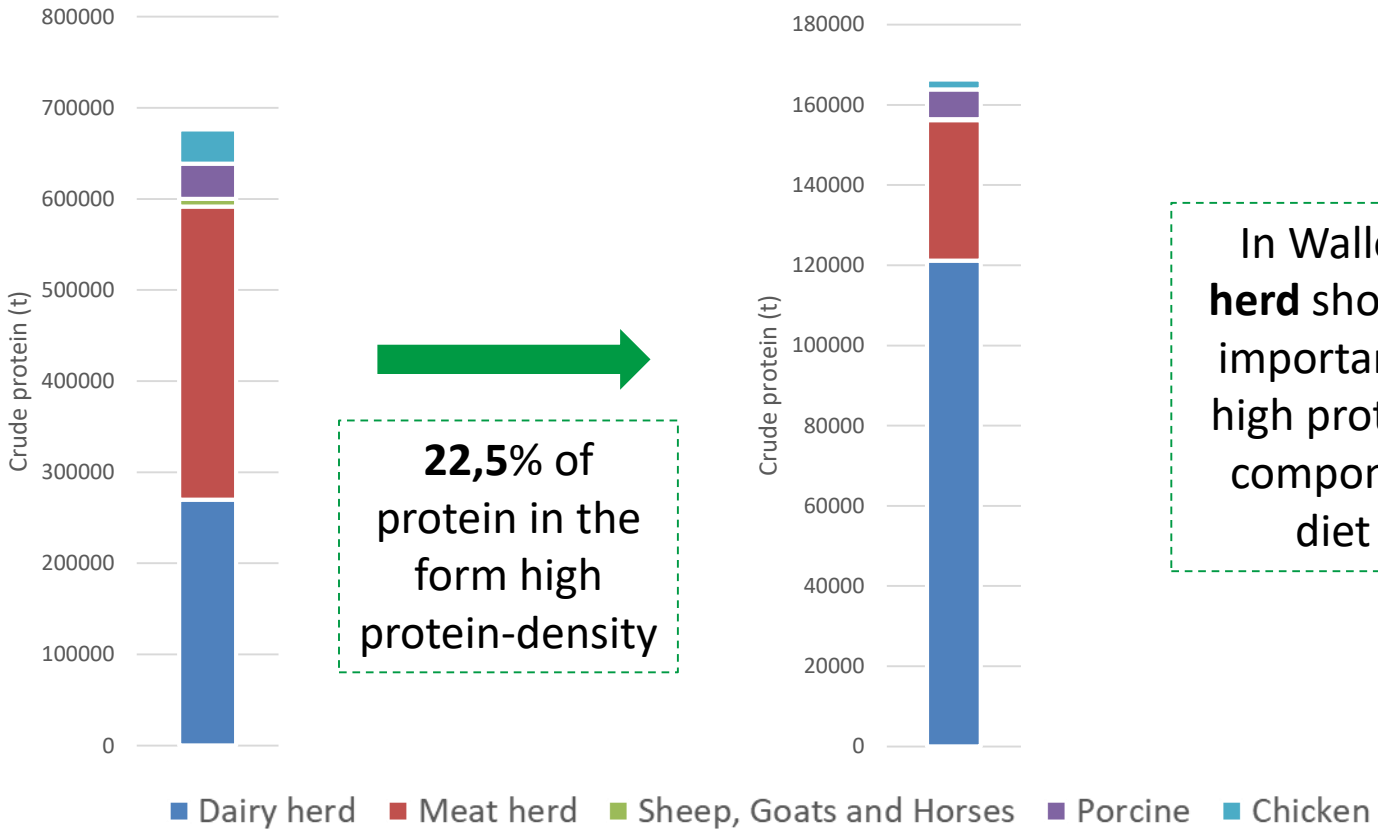
→ Correction for high protein physiological needs

# Results

## Livestock protein needs

Total protein needs

High protein-density needs

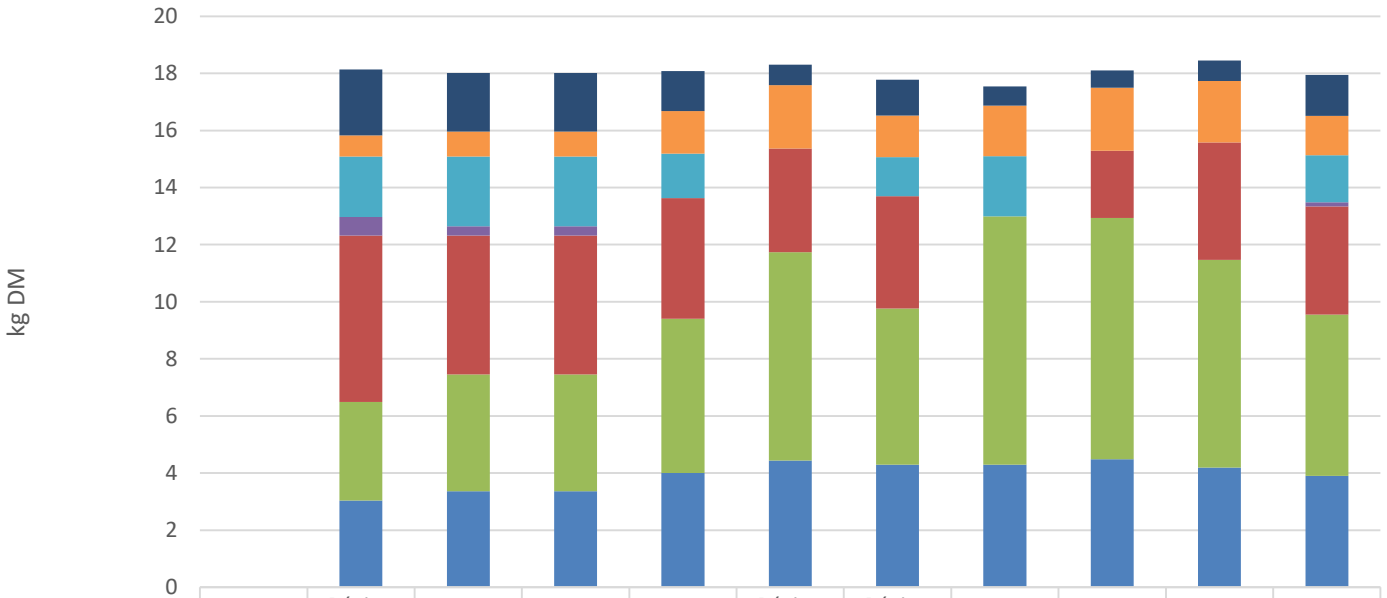



**22,5**% of protein in the form high protein-density

In Wallonia, **Dairy herd** shows the most important needs for high protein- density components in the diet (**72,8%)**

# Results

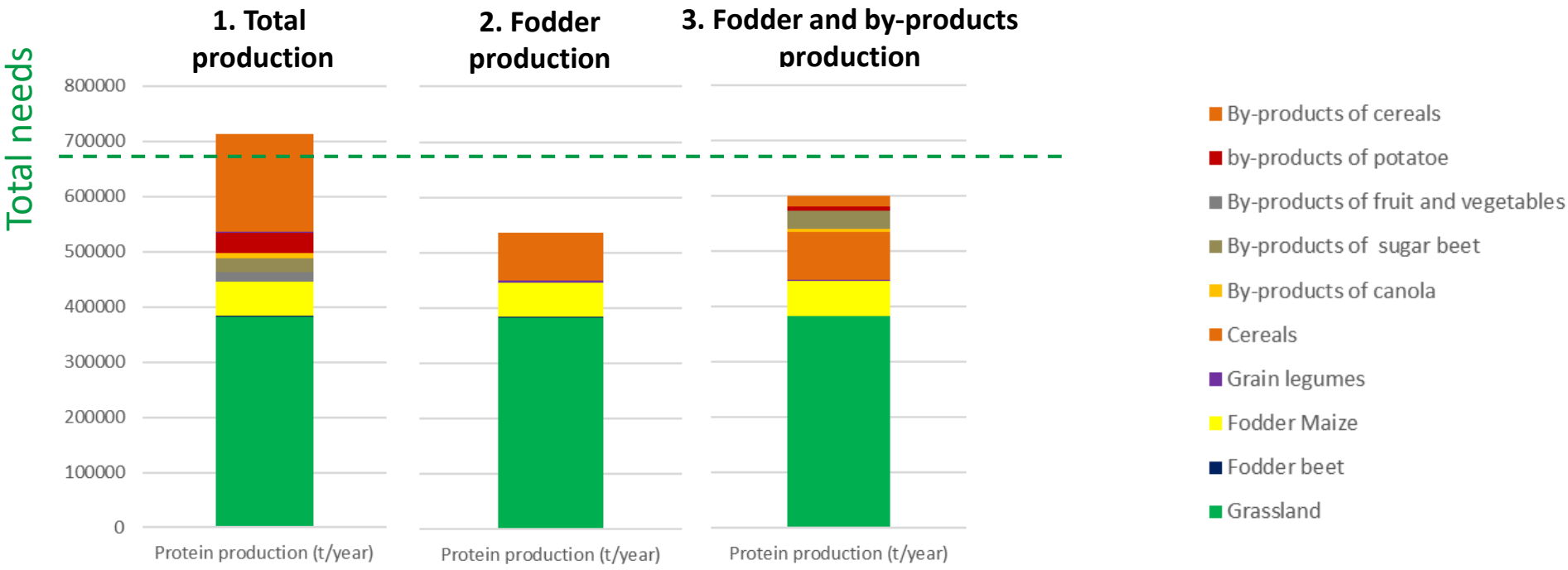
## Typical diets for dairy cows




| | | Région sablo-limoneuse | Région limoneuse | Condroz | Famenne | Région herbagère Fagne | Région herbagère Liègeoise | Haute Ardenne | Ardenne | Région Jurassique | Région Wallonne |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Soybean meal | 0 | 2,31 | 2,05 | 2,05 | 1,40 | 0,71 | 1,26 | 0,68 | 0,60 | 0,72 | 1,44 |
| Cereals | 0 | 0,74 | 0,87 | 0,87 | 1,49 | 2,22 | 1,46 | 1,76 | 2,21 | 2,16 | 1,38 |
| Beet pulp silage | 0 | 2,11 | 2,44 | 2,44 | 1,56 | 0,00 | 1,36 | 2,12 | 0,00 | 0,00 | 1,65 |
| Straw | 0 | 0,65 | 0,33 | 0,33 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,15 |
| Maize silage | 0 | 5,84 | 4,86 | 4,86 | 4,22 | 3,64 | 3,93 | 0,00 | 2,35 | 4,11 | 3,79 |
| Grass silage | 0 | 3,44 | 4,09 | 4,09 | 5,40 | 7,30 | 5,48 | 8,70 | 8,46 | 7,28 | 5,65 |
| Pasture | 0 | 3,04 | 3,36 | 3,36 | 4,00 | 4,44 | 4,29 | 4,29 | 4,48 | 4,19 | 3,89 |

In Wallonia, dairy cows need daily **1,44 kg DM** of high protein density components in their diets

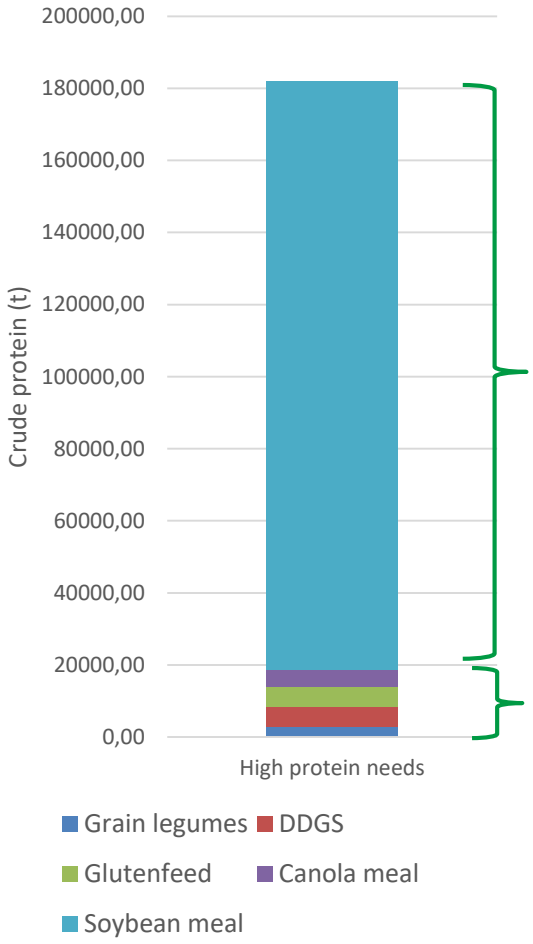
# Results




| | | | |
|---|---|---|---|
| 105,4% | 78,9% | 88,3% | Total protein autonomy |
| 26,9% | 26,9% | 26,9% | High density protein needs |
| 0,5% | 0,5% | 2,8% | High density protein production |
| 73,6% | 73,6% | **75,9%** | Corrected % for high protein density needs |

# Results

## Focus on high protein-density needs

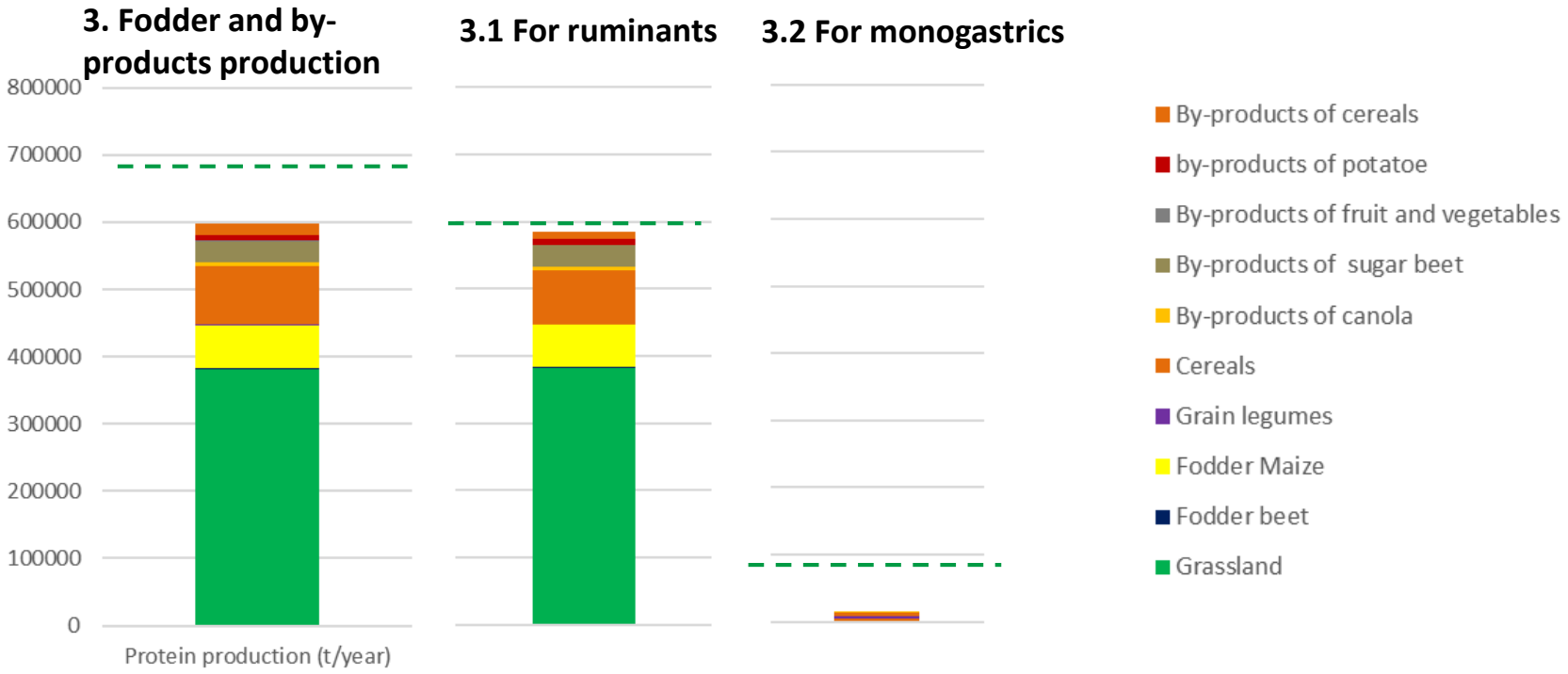



**89,8%**
Soybean meal or other imported protein-rich feed component

**10,2%**
Self-produced high protein-density feed component

From which 8,6% are by-products

# Results




| | | | |
|---|---|---|---|
| 88,3% | 97,0% | 39,6% | Total protein autonomy |
| 26,9% | 28,7% | 13,0% | High protein- density needs |
| 2,8% | 3,1% | 12,3% | High protein- density production |
| 75,9% | **63,4%** | **20,6%** | Corrected % for high protein density needs |

# Discussion

- Productions

  - Grassland is an important providor of protein, and the yields are variable and difficult to estimate with precision

  - At the level of the region, by-products production and flows are also complicated to estimate

- Needs

  - Theoritical needs : sometimes farmers give more than the theoretical protein needs (security margin) and protein losses are not taken into consideration

# Conclusion

- The way we consider protein autonomy is crucial
- Monogastrics show the lowest protein autonomy (**20,6%)**
- **22,5%** of the protein needs of walloon livestock is under the form of high protein-density feed (>15% protein) from which dairy cows are the most important users (**72,8%)**
- Wallonia produces few high protein-density protein (**10,2%**)
- By-products are an interesting way of enhancing our production of high protein-density feed at a regional scale

# Sources


1. MVO, Soybean and soybean meal, main cultivation and trade flows. May 2015.
2. Rosario, D. and Robin, C. La Commission publie un rapport sur le développement des protéines végétales dans l'UE. Communiqué de presse. 22 november 2018.
3. Statbel. «Exploitations agricoles et horticoles.» statbel. 2014-2015-2016. https://statbel.fgov.be/fr/.
4. Martinelli, L.A.; Batistella, M.; Silva, R.F.B.; Moran, E. Soy Expansion and Socioeconomic Development in Municipalities of Brazil. Land **2017**, 6, 62.
5. WalOnMap.