Assessment of energy consumption pattern in a sample of walloon livestock farming systems

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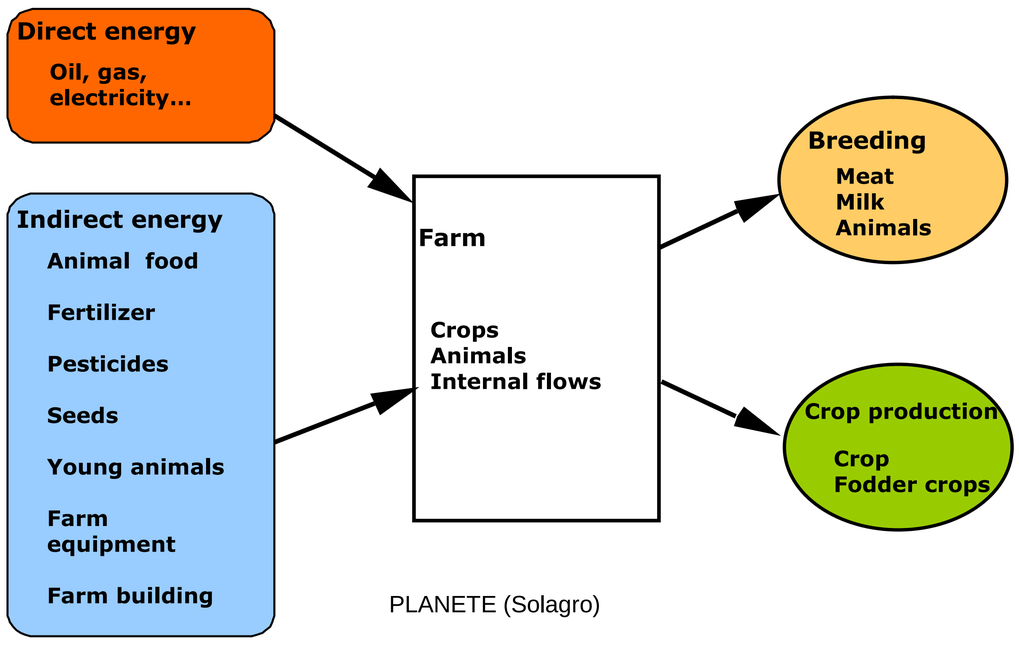
Introduction

As other sector, agricultural systems have to face the **fluctuations in energy prices**. Indeed, in 2003, this sector consumed, in Wallonia, an equivalent of **40 millions euros of fuel and electricity** (Bouquiaux, 2003). These energy costs are only the direct energy used on the farm. Aside, there is indirect energy used to produce and transport inputs like feedstuffs, fertilizers, etc. In order to reduce these direct and indirect costs, it is important to have a better understanding of the diversity of energy consumption patterns in Walloon farming systems to identify the leeway of **progress** and to advise farmers on how to **improve their energy - use efficiency.**



PLANETE (Solagro)

Methods

Energy consumption was assessed on 20 walloon farms using **Planete** (Bochu, 2007). For all inputs used on the farm, the total energy to manufacture, transport and recycle them, are included. All **direct energies** are taken into account (fuel and other by-products, electricity, lubricants) as well as **all inputs** purchased. The result of the assessment is an **energy profile expressed in litres of fuel equivalent** (LFE = 35.8 MJ) per year, per ha, per litre of milk or per kg of live weight.

Energy consumption in dairy systems, in litres of fuel equivalent/1000 litres of milk/year

	Dairy farms (n = 3)		Dairy/beef farms (n=4)	
	Mean ± std (*) [min-max]	*%*	*Mean ± std (*) [min-max]*	*%*
Fuel by-products	28.4 ± 2.68 [23.2-32.1]	24	25.5 ± 7.29 [8.4-42.2]	16
Electricity	19.8 ± 3.32 [15.5-26.3]	17	26.1 ± 7.40 [10.5-45.4]	17
Feedstuff	19.9 ± 1.42 [18.3-22.7]	17	59.8 ± 22.28 [23.4-115.3]	38
Fertilizer	27.6 ± 8.04 [14.4-42.1]	23	25.0 ± 2.80 [18.8-30.4]	16
Agricultural equipment and buildings	15.1 ± 6.23 [2.9-23.6]	13	9.3 ± 1.58 [6.8-13.9]	6
Young animals, plastic (silage), veterinary products	7.0 ± 1.32 [4.4-8.7]	6	10.2 ± 0.93 [8.7-12.8]	6
Total	119.7 ± 17.43 [99.4-154.4]	100	157.2 ± 29.79 [103.9-242.5]	100

(*) Standard deviation of the mean

Results

Difference between dairy/beef and dairy systems = 37.5 LFE /1000 litres of milk :

- with an average value of 2.39 Livestock Unit (LU) per ha of fodder crops the dairy farms need less external feedstuff than the dairy/beef farms (3.50 LU/ha fodder crops),

- the difference in the electricity item between both samples could be explained by the cow productivity (5267 litres of milk/dairy cow in dairy farms against 4783 litres of milk/dairy cow in dairy/beef farms). With equivalent quota, more cows must be milked in dairy/beef systems, meaning an increase of milking time, and so, of electricity consumption.

Energy consumption for beef production, in litres of fuel equivalent /100 kg live weight/year

	beef farms (n = 5)		Dairy/beef farms (n=4)	
	Mean ± std (*) [min-max]	*%*	*Mean ± std (*) [min-max]*	*%*
Fuel by-products	24.2 ± 5.48 [9.3-37.1]	21	24.8 ± 8.34 [9.1-48.4]	20
Electricity	8.8 ± 2.29 [2.5-15.5]	8	1.5 ± 0.56 [0.3-2.5]	1
Feedstuff	43.7 ± 10.51 [25.8-84.5]	37	52.8 ± 15.48 [25.3-82.9]	43
Fertilizer	17.8 ± 4.06 [6.2-29.6]	15	24.3 ± 3.62 [19.1-34.9]	20
Agricultural equipment and buildings	11.6 ± 3.64 [0.4-23.3]	10	9.4 ± 2.14 [5.3-15.1]	8
Young animals, plastic (silage), veterinary products	9.0 ± 2.06 [3.3-13.7]	8	9.8 ± 0.53 [8.5-10.8]	8
Total	116.8 ± 17.27 [68.7-162.5]	100	123.8 ± 11.17 [90.6-138.1]	100

(*) Standard deviation of the mean

The average energy consumption per 100 kg of live weight sold in **beef and dairy/beef systems** is quite similar for both samples (116.8 and 123.8 LFE/100 kg):

- the difference observed for the fertilizer items is probably linked to the higher stocking rate in the dairy/beef farms (3.50 LU /ha fodder crops) than in the beef farms (2.56 LU/ha fodder crops).

- the electricity item is less important than for the milk production as the electricity used by the milking machine is allocated on milk.

Conclusions

Energy consumption assessment is a tool allowing farmers to compare their situation with other farms and to assess the possibilities of saving energy. Results showed that :

-**Important variability** exists between and within farm types ⇒ **improvements** in energy consumption are possible !

-For all farm's types, **fuel, electricity, fertilizer and animal feed** represent all together more than 80% of the total energy consumption.

Nevertheless, this is a first approach, not representative of the variety of farming systems existing in Wallonia ⇒ in the context of the OPTENERGES project (INTERREG IVa program – Great Area), such assessment will be done on 60 Walloon livestock farms. This will allow the identification of ways to reduce energy consumption.

Supported by the Walloon Region and the European Union (ERDF fund)

Union Européenne
Fonds Européen de Développement Régional

Optenerges

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