

**Deliverable Factsheet**

**Date: 14 November 2012**

<b>Deliverable No.</b>	6.1
<b>Working Package</b>	6
<b>Partner responsible</b>	ABER
<b>Other partners participating</b>	ILVO
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<b>Finalization date</b>	
<b>Relevant Task(s):</b>	T6.1.1 & T6.1.2

**Brief description of the Deliverable**

Assessment of the relative economic performance of organic, low input and conventional EU27 dairy farms through the analysis of FADN farm panel data, including the development of an indicator to identify low input dairy farms within the dataset.

**Target audience(s)**

Project team, Stakeholder platform, Policymakers

**Executive Summary**

This report summarises the characteristics and relative economic performance of organic and low-input European dairy holdings, through the assessment of dairy farm data identified in the FADN dataset for 2007 and 2008. Organic holdings as defined by Regulation (EC) 834/2007 are clearly identified within farm economic datasets of FADN. The same is not true for low input farms, as there is no formal definition and low input holdings are hidden within the main conventional farm dataset.

The first objective of this report was to provide a definition of low-input farming so that the economic

performance of low-input farms could be assessed, which began by identifying holdings in the FADN data set for 2007 and 2008 as either dairy cow or dairy sheep/goat holdings for the analysis. The dataset comprising a dairy cow sample size of 32,514 holdings; the dairy sheep/goat sample comprising of 2482 sampled holdings (forming the un-weighted dataset).

Each holding within the FADN database is assigned a weighting value that can be applied to create a weighted dataset of 1,492,515 dairy cow holdings and 123,556 sheep/goat holdings was formed that represents approximately 90% of farm holdings within the EU (based on the Farm Structure Survey, (European Commission, 2012). In this report results are presented for the un-weighted and weighted data set. The results may vary considerably between these datasets as the weighted dataset comprises a high number of holdings in some newer member states (MS), Poland and Romania in particular.

Inspired by the intensity indicator of the IRENA project (EEA, 2005), a low input indicator (LI) was developed for use within the SOLID project, and specifically to identify low input dairy systems within the EU27 FADN dataset for this analysis. The development involved testing and refinement with national (UK and BE) and EU data and consultation with stakeholders in the SOLID project. The chosen LI indicator includes total farm expenditure of purchased feed (for grazing livestock), fertiliser, crop protection and energy, expressed as € per Grazing Livestock Unit (€/GLU). Cut-off values were calculated for each state of the EU from the conventional farm dataset using quartiles, for each MS, to allow for variation in systems across the EU. Classes were defined as: Low Input (LI), Medium Input (MI) and High Input (HI). These three groups were then compared with the organic (ORG) farm group in the EU 27, EU 15 and in newer member states. Following this definition, there were 7645 LI dairy cow farms and 593 LI dairy sheep and goat farms identified within the un-weighted conventional farm FADN data set of 30724 and 2428 holdings respectively, with an additional 1815 dairy cow and 54 dairy sheep/goat organic farms. (See Table 9 and Table 10 for a full breakdown of sample sizes).

Results of the economic analysis in this report are presented as medians, as they are more representative of the centre point in skewed data, and less affected by extreme values. Economic results are presented as whole farm (€ per Annual Worker Unit and € per Utilisable Agricultural Area hectare) and as dairy enterprise data (€ per tonne of milk produced). Farm Net Income (FNI) for the whole farm comprises sales and support payments minus direct and external costs, the Net Margin (before own factors) represents sales minus direct and external costs for the dairy enterprise.

The un-weighted dataset was statistically analysed using the Kruskal Wallis statistical method which uses rank not actual values, so is less affected by skewed, non-normal data distribution often seen in financial datasets.

## Dairy Cow holdings

Table A (un-weighted data) summarises the key dairy cow holding economic indicators assessed within this report, and indicated that at whole farm level, Farm Net Income per AWU was similar for LI, MI and ORG holdings, with HI farms significantly lower. When assessed as FNI per hectare, LI and MI farms were the most profitable, with HI and ORG holdings significantly lower. At dairy enterprise level, LI holding Net Margin (before own factors) was significantly higher, with HI and ORG holdings the achieving the lowest margins.

**Table A Summary of dairy cow holding economic indicators (un-weighted data, 2007 & 2008)**

Economic Variables	EU27	LI	MI	HI	ORG	KW Sig.
Farm Net Income (€/AWU)	Median	15464 <sup>b</sup>	16178 <sup>b</sup>	15499 <sup>a</sup>	17984 <sup>b</sup>	0.000 @ 3d.f.
	SD	28255	26036	27086	23100	
Farm Net Income (€/UAA ha)	Median	686 <sup>b</sup>	717 <sup>b</sup>	564 <sup>a</sup>	618 <sup>a</sup>	0.000 @ 3d.f.
	SD	11070	108271	14577	939	
Net Margin (BOF) (€/t milk)	Median	78 <sup>c</sup>	61 <sup>b</sup>	32 <sup>a</sup>	32 <sup>a</sup>	0.000 @ 3d.f.
	SD	283	114	104	129	
	<i>Un-weighted n</i>	7645	15398	7681	1815	

Source: EU-FADN - DG AGRI.

Table B (weighted data), indicated high profitability per AWU for ORG holdings, which may be affected by the composition of the weighted sample, though profitability per hectare is much more similar across farm groups, with LI and ORG holdings achieving higher Farm Net Incomes per hectare. At enterprise level, the weighted results mirror the un-weighted data, with LI holdings achieving the best NM (BOF), but ORG farms performing below the other groups.

**Table B Summary of dairy cow economic indicators (weighted data, 2007 & 2008)**

Economic Variables	EU27	LI	MI	HI	ORG
Farm Net Income (€/AWU)	Median	6780	6428	4911	11633
Farm Net Income (€/t milk)	Median	712	665	535	686
Net Margin (BOF) (€/t milk)	Median	92	67	38	36
	<i>Weighted n</i>	339700	718332	364174	70309

Source: EU-FADN - DG AGRI.

Indirect environmental and efficiency indicators (Table C), indicated ORG holdings to have slightly lower input expenditure per hectare (IRENA, €/ha) and stocking rates (GLU/ha) than LI holdings, but significantly lower milk production per forage hectare, and higher "SOLID" direct input costs (feed, fertiliser, crop protection and energy). The ORG stocking rate was low, but higher concentrate feed input expenditure per hectare (see Table 19, page24), will also have required greater land use due to lower yields of organic cereals, so total land use per tonne of milk may be substantially higher than conventional systems.

**Table C Summary of dairy cow system indicators (weighted data, 2007 & 2008)**

Variables	EU27	LI	MI	HI	ORG	KW Sig.
IRENA costs (€/UAA ha)	Median	423 <sup>b</sup>	680 <sup>c</sup>	810 <sup>d</sup>	344 <sup>a</sup>	0.000 @ 3d.f.
	SD	7793	510947	61493	677	
GLU (GLU/forage ha)	Median	1.74 <sup>b</sup>	1.94 <sup>c</sup>	1.90 <sup>c</sup>	1.12 <sup>a</sup>	0.000 @ 3d.f.
	SD	11.86	21.43	35.92	0.78	
Milk yield (t/forage ha)	Median	6.1 <sup>b</sup>	8.3 <sup>c</sup>	9.3 <sup>d</sup>	4.4 <sup>a</sup>	0.000 @ 3d.f.
	SD	49.2	161.5	246.1	4.1	
SOLID (Feed, fert, CP and energy) (€/t milk)	Median	147 <sup>a</sup>	187 <sup>c</sup>	237 <sup>d</sup>	181 <sup>b</sup>	0.000 @ 3d.f.
	SD	507	138	137	415	
	<i>Un-weighted n</i>	7547	15353	7667	1814	

Source: EU-FADN - DG AGRI.

In summary, ORG dairy cow ORG holdings were more profitable at whole farm level, which appears to have been achieved through higher support payments, as performance per tonne of milk produced is poor, despite low direct input costs per hectare. The data also indicated that LI holdings achieved economically efficient milk production through lower costs for key inputs such as feed, fertiliser, crop protection and energy. Furthermore, the lower inputs (as indicated by the IRENA indicator) could also provide environmental benefits such as increased biodiversity, as identified through the EU BioBio project (Herzog et al., 2012).

### Dairy Sheep/Goat holdings

The statistical analysis results in Table D (un-weighted data), indicate that profitability at whole farm level per AWU was not significantly different between groups, though FNI per ha was lowest for ORG holdings. Dairy enterprise net margins indicated significantly higher Net Margin (before own factors) for LI farms.

**Table D Summary of dairy sheep and goat economic indicators (un-weighted data, 2007/08)**

Economic Variables	EU27	LI	MI	HI	ORG	KW Sig.
Farm Net Income (€/AWU)	Median	17663	17560	15721	16759	N.S.
	SD	20933	21779	23963	18663	
Farm Net Income (€/UAA ha)	Median	882 <sup>ab</sup>	1070 <sup>b</sup>	1125 <sup>b</sup>	864 <sup>a</sup>	0.024 @ 3d.f.
	SD	14681	18539	14382	14526	
NM (BOF) (€/t milk)	Median	365 <sup>c</sup>	292 <sup>b</sup>	241 <sup>a</sup>	254 <sup>ab</sup>	0.000 @ 3d.f.
	SD	870	376	2159	2912	
	<i>Un-weighted n</i>	593	1214	621	54	

Source: EU-FADN - DG AGRI.

Table E (weighted data), indicated greater differences between farm groups with FNI/AWU highest for LI holdings and lowest for HI farms. The results showed a similar trend when assessed per hectare, with LI and MI holdings performing the best. At enterprise level, results were similar to the un-

weighted data with LI and MI holdings achieving the best margins, though ORG holdings were lower than all the other groups.

**Table E Summary of dairy sheep and goat economic indicators (weighted data, 2007 & 2008)**

Economic Variables	EU27	LI	MI	HI	ORG
Farm Net Income (€/AWU)	Median	14275	12256	8702	13450
Farm Net Income (€/t milk)	Median	1075	1609	818	882
Net Margin (BOF) (€/t milk)	Median	347	266	195	86
	<i>Weighted n</i>	28361	59048	33233	2914

Source: EU-FADN - DG AGRI.

The efficiency and environmental indicator data (Table F) indicates that the ORG group received higher agri-environmental scheme payments while IRENA indicator inputs were similar to the LI group, with the HI group having significantly greater inputs per hectare. Stocking rates were significantly lower for the ORG group and increased between the LI and HI conventional farms. Milk yield per forage hectare varied considerably between systems, with the lowest yield from LI and ORG holdings and the highest from HI farms, but ORG holding SOLID costs (feed, fertiliser, crop protection and energy) per tonne of milk were as high as HI holdings but milk produced per hectare was at the same level as LI holdings, reflecting the high cost of ORG inputs and/or inefficiency in the system.

**Table F Summary of dairy sheep and goat system indicators (weighted data, 2007 & 2008)**

Variables	EU27	LI	MI	HI	ORG	KW Sig.
IRENA (€/UAA ha)	Median	369 <sup>a</sup>	745 <sup>a</sup>	1308 <sup>a</sup>	384 <sup>a</sup>	0.000 @ 3d.f.
	<i>SD</i>	7823	11700	13386	17118	
GLU (GLU/forage ha)	Median	1.12 <sup>a</sup>	1.27 <sup>a</sup>	1.76 <sup>a</sup>	0.98 <sup>a</sup>	0.000 @ 3d.f.
	<i>SD</i>	16.66	19.10	77.38	10.08	
Milk yield (t/forage ha)	Median	1.5 <sup>a</sup>	2.3 <sup>b</sup>	4.8 <sup>c</sup>	1.6 <sup>a</sup>	0.000 @ 3d.f.
	<i>SD</i>	23.5	38.0	198.7	25.4	
SOLID (€/t milk)	Median	356 <sup>a</sup>	458 <sup>b</sup>	558 <sup>c</sup>	516 <sup>bc</sup>	0.000 @ 3d.f.
	<i>SD</i>	327	265	519	730	
	<i>Un-weighted n</i>	527	1083	576	54	

Source: EU-FADN - DG AGRI.

In summary, the results indicated that LI farms formed a compromise between profitability, efficient milk production and environmental impact (based on indirect indicators), but the organic holdings appeared to perform poorly, though the sample was small so may not be representative.

## Overall conclusions

Results from this analysis indicate that organic dairy systems have low direct input costs per hectare, but high direct and external costs when assessed per tonne of milk produced. Organic farm

profitability was supported through high levels of support payments that often resulted in profitability above conventional farm levels. However, LI holdings achieved better enterprise Net Margins through production of milk at lower costs, with similar levels of input expenditure per hectare, (when assessed through the IRENA intensity indicator). Organic systems indicated higher concentrate feed costs (and potentially greater land area usage for concentrate feed production) compared to LI farms, whilst LI systems had greater fertiliser costs per hectare than ORG farms.

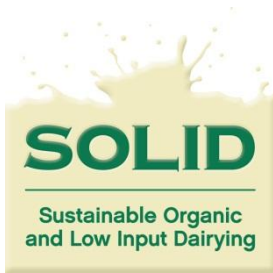
Therefore it is possible that LI holdings may represent an economically more efficient farm system for delivering agriculture with environmental benefits, such as improved biodiversity (as a result of low fertiliser, crop protection and concentrate feed use) and would require less financial support to be profitable. At present though, ORG holdings may represent the most profitable option, though this will depend on limitations such as land area, which has driven increased farming intensity.

Environmental assessments of comparative dairy farm systems within SOLID project WP4 will highlight the overall environmental impact of LI and organic systems, which together with continued economic assessments will provide an integrated assessment to indicate the overall sustainability of the two lower input systems in comparison with MI and HI groups.

**Potential Stakeholder impact(s)**

A definition of low input dairy farming for use within the project and beyond. A report highlighting the relative financial viability and characteristics of low, medium and high input conventional and organic dairy holdings.

<b>Interactions with other WPs Deliverables / joint outputs</b>			
WP no.	Relevant tasks	Partner(s) involved	Context of interaction
1	1.1	ORC, ILVO	Ensuring LI indicator was compatible with WP1 farm data.
1-8	WP leaders	ORC, BOKU, MTT, AU, UNIVPM, ILVO, UGENT, ABER	Input to finalise the LI definition



Project no. **266367**

Project acronym: **SOLID**

Project title:  
**Sustainable Organic and Low Input Dairying**

Collaborative Project

SEVENTH FRAMEWORK PROGRAMME  
KBBE.2010.1.2-02  
Sustainable organic and low-input dairy production

**Title of Deliverable:**

**D6.1** Economic analysis of EU dairy systems

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Work package Leader: Ludwig Lauwers

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