The standard labour unit as a basis for calculating direct payment systems

Matthias Schick

Agroscope Reckenholz-Tänikon Research Station ART,

Tänikon 1, 8356 Ettenhausen, Switzerland
Corresponding author's email address: Matthias.schick@agroscope.admin.ch

ABSTRACT

The Swiss direct payment system is based on what is known as a standard labour unit. The standard labour unit (SLU) records the overall working time requirement of a farm using standardised factors. There are three factors for utilised agricultural area and four for animal husbandry. There are supplements for sloping sites, organic farming and orchards.
A farm only qualifies for direct payments if it has a minimum working time requirement of 0.25 SLU.
The system can easily be transferred to the EU or other countries and provides a very accurate picture of the need for direct payments.

Keywords: working time requirement, standard labour unit (SLU), direct payment, working time.

1. INTRODUCTION

Direct payment systems in the EU and worldwide are based on a minimum area, which means that direct payments are only made if a minimum area is farmed, e.g. 3 ha. This puts small farms with a low land area and an intensive stocking rate at a severe disadvantage.
Switzerland has therefore developed a direct payment system based on the standard labour unit. This means that a farm must have a minimum number of area- and stocking density-dependent labour units in order to qualify for direct payments.

2. MATERIAL AND METHODS

In Swiss agriculture the standard labour unit (SLU) is a unit for recording the overall working time requirement of a farm using standardised factors. In order to show standard labour unit values, all agricultural production processes have to be defined and expressed as applicable to the whole sector. The associated working time requirement values are causally recorded, edited and statistically analysed. All the qualitative and quantitative variables acting on the task elements are also recorded and incorporated in a model calculation system with upper and lower bounds. On this basis the working times for production processes can be collected and made available for further use. Comparable production processes, for example the cultivation of winter wheat and barley as well as all the major grain crops, can be combined into production groups. This considerably reduces the number of production processes to be taken into consideration. These can be further condensed into seven categories (utilised agricultural area (UAA), special crops, vines, dairy cattle, fattening pigs, breeding pigs, other livestock) (see Tab. 1). Supplements may be created for special conditions.

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Table 1. Standard labour unit factors for Swiss agriculture

a) Utilised agricultural area UAA	**SLU**	**Ref. quantity**
UAA without special crops	0.028	ha
Special crops without steeply sloping and terraced vineyards	0.3	ha
Steeply sloping and terraced vineyards	1	ha
b) Livestock		
Dairy cows, milking sheep and goats	0.043	LU
Fattening pigs, gilts over 25 kg and weaners	0.007	LU
Breeding pigs	0.04	LU
Other livestock	0.03	LU
c) Supplements		
for sloping sites in mountain region and hill zone (18-35 %)	0.015	ha
for steep sloping sites in mountain region and hill zone (> 35 %	0.03	ha
for organic farming	20%	ha (as a))
for standard fruit trees	0.001	per tree

The minimum claim entitlement has been set at 0.25 SLU in order to exclude hobby farms from direct payments. Another eligibility criterion for the receipt of direct payments may be that a minimum amount of work (e.g. 50 %) has to be carried out by in-house labour.

2.1 ARABLE FARMING

Standardised working times in Swiss arable farming have been compiled from comprehensive working time measurements collected over 20 years (see Fig. 1).

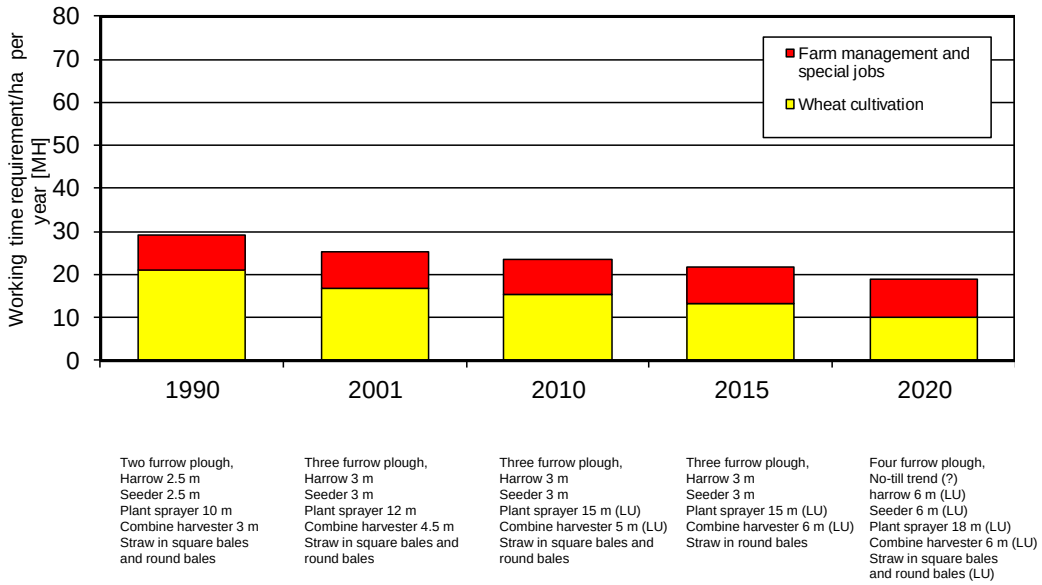

Figure 1: Standard working time requirement in arable farming with winter wheat as an example (MPh = manpower hour).

By incorporating the data in a model calculation system (PROOF) and a work budget system (ART-AV) it becomes possible to establish the standardised working time requirement as a function of technical progress, alterations in plot size and changed farm management activities.

Information on mechanisation can be expressed by consulting experts, measurements or basic statistical data. Figure 1 above shows how technical progress since 1990 has been reflected in a reduced working time requirement. The years 2015 and 2020 have been modelled on the assumption that mechanisation will continue to evolve but that plot size will remain very largely constant. The time required for farm management shows a rising trend.

2.1.1 FORAGE CROP PRODUCTION

The recording and modelling procedure for forage growing is virtually identical to that for arable farming. Here, however, distinct differences can be found between forage cultivation in the lowlands (no sloping sites) and the mountain region (with sloping and steeply sloping sites). When calculating the SLU, therefore, supplements are compiled for sloping sites (18-35% gradient) and steep hillsides (>35 % gradient) (see Tab. 1). Further supplements for especially steep sites (>50 %) are also conceivable.

Taking forage production on lowland sites as an example, it can be seen that technical progress is particularly evident in harvester working widths and loading volumes. In the period between 1990 and 2010, for example, the loading volume of forage wagons more than doubled (see Fig. 2).

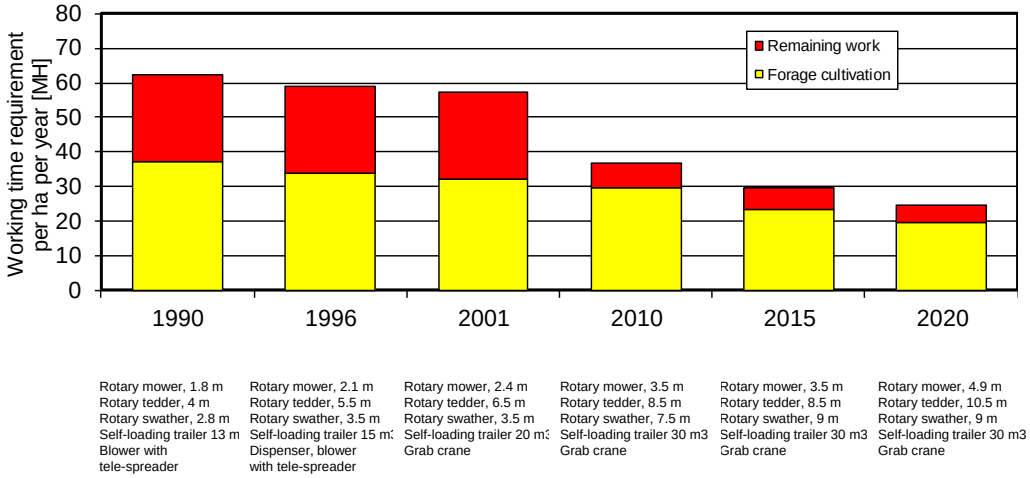

Figure 2: *Standard working time requirement for forage crop production with natural grassland as an example*

2.1.2 DAIRY FARMING

Very comprehensive time measurements for various livestock management systems have also been carried out in Swiss dairy farming. For standardisation purposes the relative percentages of tied housing and loose housing systems were used to obtain meaningful results (see Fig. 3).

The move towards loose housing systems is taking place only slowly. In 1990 the commonest system was still tied housing at 97 %. Loose housing now accounts for approximately one third and it is anticipated that by 2020 its share will be over 50 %.

Using loose housing as an example, Figure 3 shows how working time requirement and mechanisation have evolved since 1990 and how this trend is continuing. There is clear evidence of a reduction in the time requirement per animal and an increase of more than 75 % in herd size

over the last 20 years. A considerable increase in labour-saving and electronic devices is also discernible.

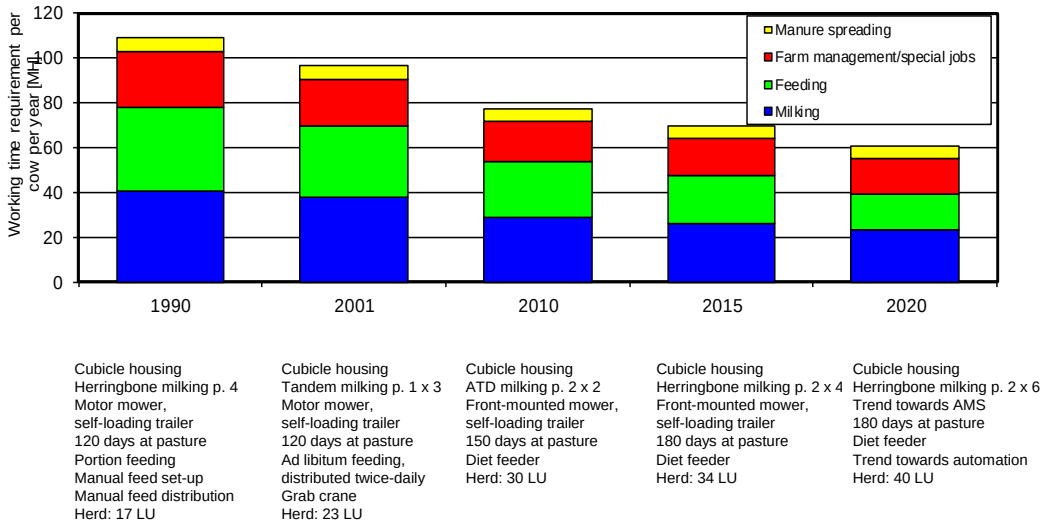

Figure 3. Standard working time requirement for dairy farming with loose housing as an example

In dairy farming the trend is towards a reduction in the time assigned to farm management activities due to the use of electronic herd management devices.
In order to show the total working time requirement, the relative shares of loose housing and tied housing were combined to represent a standard dairy farm (see Fig. 4).
Here it is clear that standardisation gives an essentially more accurate picture of labour organisation on Swiss dairy farms than would be permitted by the exclusive consideration of modern loose housing.
Although the working time requirement is also subject to a degression effect, from over 150 MPh per cow per year in 1990 to approx. 70 MPh in 2020, the base level is around 40 MPh higher than in loose housing. It can also be established that the greatest potential for savings in dairy farming is in the sphere of feeding and milking jobs. The major savings potential identifiable here is the use of automatic process technology (automatic milking and automatic feeding).

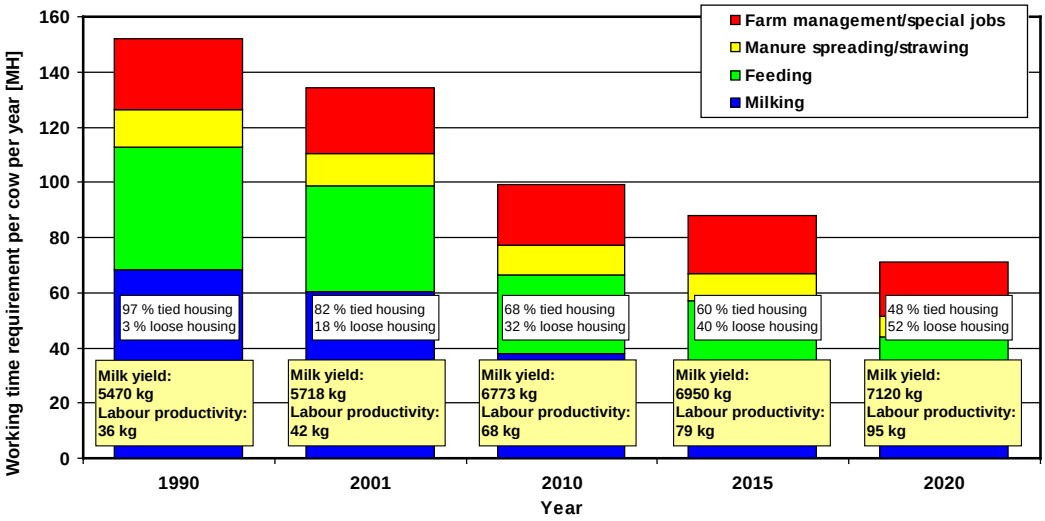

Figure 4. Standard working time requirement in dairy farming as a whole

4. DISCUSSION

The SLU number for an overall operation is calculated on the basis of the SLU factors and the corresponding number of animals or area of a farm. One SLU is equivalent to 2800 MPh per year. On the one hand the SLU is the basis and qualifying criterion for direct payments. On the other hand, the SLU number is also a limiting value for development and structural improvement measures on a farm-by-farm basis. The SLU factors can be periodically updated by incorporating technical advances. Although they never show a farm's precise working time requirement, they can be considered a rough estimate.

The advantage of this procedure is its simplicity of use. A SLU number for a complete farm can be produced in a few minutes with only the 7 SLU factors and 4 supplements.

The drawback of the procedure is its inaccuracy. In particular insufficient account is taken of smaller farms with a low area yet a high degree of specialisation, which are disadvantaged accordingly. Indoor and outdoor yard locations are not included in the standardised calculations, nor are farm home economics, para-agriculture or direct marketing.

In this context there are two possible solutions. Firstly, the use of what is known as a global work budget (GWB). Here software is used to produce the entries on herd number and land area by analogy with the SLU input form. The SLU number for the farm can then be quickly produced with the GWB using standard terms of reference (see Fig. 5). If the global entries are inadequate or if farm-specific adjustments are necessary, these can be implemented directly in the software and a farm-specific SLU value can be created.

Figure 5. Standard working time requirement for dairy farming with global work budget.

Production method	Unit (U)	MPh/U	Scope	Total MPh	LU	SLU
Dairy cows	Animals	120..6	20	2412.6	20	0.860
of which farm management and special jobs				521.6		
Calves	Places	100.1	4	400.4	1	0.043
of which farm management and special jobs				13.6		
Grassland 4 conservation cuts	ha	20	12	240.6		0.336
of which farm management and special jobs				62.8		
Winter wheat	ha	25	2	50		0.056
of which farm management and special jobs				20		
Silage maize	ha	27	2	54.9		0.056
of which farm management and special jobs				20		
Farm management and special jobs non-assignable				200		
	Farm total (MPh)			3358.6		
	Labour units (LU) required at 2800 MPh per			1.2	Total SLU	1.351
	Labour units (LU) required at 2400 MPh per			1.4		
	Labour force supply (MPh)			1		

Secondly, there is the option of using the detailed work budget for the accurate derivation of an individual farm's SLU value. Here the degree of entry detail can be freely selected. It is moreover possible to integrate and accurately model household, para-agriculture and direct marketing. The one-off data acquisition work involved comes to approximately 20 minutes per farm. Various versions can then be saved and used individually for SLU numbers, process optimisation and even farm planning.

The working time requirement identified by the work budget system taking individual farm variables into account is then compared with the standardised SLU factors. Any sizeable variations can be tracked and interpreted, something impossible to do with the previous SLU factors.

The calculation of SLU values at the global or detailed work budget system level is preferable to all the other methods, since with both methods virtually all farm-related influencing variables can be transparently accounted for.

The advantage of this method to individual farms is that optimisation measures and production changes on a farm-by-farm basis can be evaluated directly in terms of their SLU effect. The advantage to planners and authorities is that with identical underlying data they are better able to classify borderline cases and obtain a realistic picture of a farm's labour organisation situation. An initial indication of the workload situation on a farm is also possible, as the supply of labour units is compared directly with demand. Major variations signal a need for action.

5. CONCLUSIONS

Labour is the most important production factor on every farm. It is therefore logical to use human labour as the basis for a direct payment system and for development and structural improvement measures. Upper and lower bounds act as a simple system limitation.

Due to increasing diversification measures on farms, however, seven factors are no longer sufficient to give a correct description of the volume of work on all Swiss farms. Combinations of earnings, farm household, direct marketing and even para-agriculture can be modelled extremely accurately at reasonable cost with modern work budget systems, thus serving to effect a fair allocation of payments in line with the performance principle.

REFERENCES

NÄF, E. (1996): Neuer Windows-Arbeitsvoranschlag für Tal- und Bergbetriebe. Agrarforschung 3 (1), S. 14 - 16

RIEGEL, M.; SCHICK, M and R. STARK (2007): Working-time requirement in agriculture – recording method, model calculation and work budget. Society for Engineering in Agriculture, 2007 National Conference. Agriculture and Engineering - Challenge Today, Technology Tomorrow. 23-26 September, 2007, Adelaide, South Australia. Editors: T. Banhazi and C. Saunders. S. 328

SCHICK, M. (2008). Dynamische Modellierung landwirtschaftlicher Arbeit unter besonderer Berücksichtigung der Arbeitsplanung. Ergonomia-Verlag, Stuttgart.

SCHICK, M. u. R. STARK (2006): Der neue Arbeitsvoranschlag – ein modernes arbeitswirtschaftliches Kalkulationssystem. Informationstagung Agrarökonomie, Agroscope Reckenholz-Tänikon ART, 14.09.2006, 6 S

SCHICK, M. (2007): Der Arbeitsvoranschlag unter Berücksichtigung von Arbeitsorganisation und Zeitplanung. 15. Arbeitswissenschaftliches Seminar, Landtechnische Schriftenreihe Nr. 230, S. 145 - 149

SCHICK, M. (2008): Vom ART-Arbeitsvoranschlag zur Standardarbeitskraft. ART-Schriftenreihe, 7, S. 103-109

SCHICK, M. & Stark, R. (2008): Betriebsoptimierung leicht gemacht. Der neue ART-Arbeitsvoranschlag. UFA-Revue, S. 12, 7SH.

Schick, M. (2011). Role of human labour in relation to efficiency and effectiveness, with particular regard to small-scale farms. Book of abstracts (with full papers on CD in-side). XXXIV CIOSTA CIGR V Conference 2011 – Efficient and safe production processes in sustainable agriculture and forestry, 29 June - 1 July 2011, University of Natural Resources and Applied Life Sciences, Vienna - Austria. 1-9.

SCHICK, M. (2007): Work science in agriculture and forestry: from work procedure-based to system approach. XXXII CIOSTA-CIGR Section V Conference “Advances in labour and machinery management for a profitable agriculture and forestry”. Nitra, 17.-19.09.2007, Tagungsband S. 26 - 33

SCHICK, M. (2007): Workload assessment in agriculture - inclusion in a work budget system. XXXII CIOSTA-CIGR Section V Conference “Advances in labour and machinery management for a profitable agriculture and forestry”. Nitra, 17.-19.09.2007, Tagungsband S. 597 - 602

SCHICK, M. (2006): Work-budget systems taking into account work organisation and time planning. World Congress: Agricultural Engineering for a Better World. Book of Abstracts, VDI-Verlag, Düsseldorf, VDI-Berichte Nr. 1958, S. 809 - 810

WAGNER, A. & SCHICK, M. (2012). 18. Arbeitswissenschaftliches Kolloquium. 13./14. März 2012, Forschungsanstalt Agroscope Reckenholz-Tänikon Art. Ettenhausen, pp. 1-188.