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Are Swiss farmers overworked? Evidence from a labour requirement calculation model

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ABSTRACT

This study focuses on workload as a sustainability indicator comparing the modelled demand for labour—based on a farm's production portfolio—with the deployed labour resources on the farm, according to self-declared statistics. It uses a sample of 700 farms that provide detailed bookkeeping data. The descriptive analysis indicates that 10 % of the sample are underworked, whereas 34 % are clearly overworked, with a labour deficit exceeding 20 %. The econometric analysis shows that diversified farms and those focusing on husbandry are the most likely to experience overwork. It also reveals that farms working with contractors face a higher risk of overwork, while employing hired workers reduces this risk.

1. Introduction

While the environmental sustainability of farming has become a focal point of research for around 50 years, the social dimension of sustainability in agriculture has received increasing attention in recent years. This trend aligns well with the definition of Sustainable Development Goals (SDG; UNDP, 2015). This primarily relates to SDG 8, decent work and economic growth (Ehiogu and Chidiebere-Mark, 2019; Yu and Osabohien, 2023; Grgić, 2025), but also to others like SDG 3, social health and well-being (Petelos et al., 2025). While SDG 8 focuses directly on the quantity and quality of work, many other indicators like health are also strongly dependent on labour aspects.

This paper aims to contribute to the literature on sustainable labour in the agricultural sector by building on the work by Umstätter et al. (2022), who used the model-based Global Work Budget (GWB) to create an objective and robust indicator of a farm's workload. The GWB is an option within the ART-AV software Version 1.4.2 developed by Agroscope (Ettenhausen, Switzerland; Heitkämper et al., 2020), also publicly available as the "Labourscope" model. In their study, Umstätter et al. modelled the required workforce on a farm using the GWB tool and compared it to the available labour resources on each farm, using a sample of 30 farms. They termed this relationship the sustainability indicator of workload (SIW). Such a comparison between the available and the needed resources in terms of labour may be a possible indicator for both under- and overwork and therefore offers significant potential for a broader analysis across the farming population. Umstätter et al. (2022) argue that, due to unexpected events like sickness or broken machines, one should never need to use 100 per cent of the available workforce. Therefore, they suggested the following classification for the SIW: values **below 0.6** indicate underwork, **0.6–0.9** represent a sustainable workload, **0.9–1.2** are considered critical; values **above 1.2** indicate overwork. While underwork, defined as a lack of tasks to do, poses a societal problem (Alexander and Haley-Lock, 2015), the focus in the literature on social sustainability in agriculture is on overwork as will be shown below.

We begin in Section 2 by describing the state of research and embedding the Umstätter model and our contribution in it. Then we use the extension of this method to a larger sample from Swiss agriculture, which offers the opportunity to address the following key research questions:

I. What proportion of the farming population is, according to the scale developed by Umstätter et al. (2022), underworked, within a sustainable range, overworked or in a critical stage?
II. What farm characteristics are the most important predictors of this ratio?

These questions are addressed by linking the labour requirement calculation model "LabourScope" to the Swiss FADN sample as described in Section 2, and by analysing the resulting dataset as outlined in Section 3. The results are then presented in Section 4 and discussed in Section 5.

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2. Theoretical background

It is difficult to overestimate the role of labour in achieving socially sustainable agriculture. In a review of the dimensions of sustainability in agriculture, Janker et al. (2018) identify labour conditions as a central theme in the scientific discourse. Child labour, work safety and forced labour - the most frequent indicators in social sustainability assessment tools in agriculture (Mann, 2018) -are all related to farm labour. However, this literature also reveals a strong focus in social sustainability research on farming systems where most persons working on the farm are employees.

The social sustainability of family farming has only recently received significant attention (Wohlenberg et al., 2022; Mirzayi and Sepahpanah, 2022; Saleh and Ehlers, 2025). While in plantations and other forms of commercial farming, the exploitation of labourers is the largest threat, in family farming it is often self-exploitation and resulting overwork. The time-cost squeeze (Newsome, 2020) may compel many farmers to skip leisure and family life for the requirements of their growing farms. Therefore, there is not only broad consensus that burnout caused by overwork is a growing concern (Reith, 2018; Gualano et al., 2021; Di Vincenzo et al., 2024), but also that farm managers belong to the professions that are affected at above-average rates (Kallioniemi et al., 2016; Jones-Bitton et al., 2019; Reissig et al., 2019). While it is far from clear how this problem is to be solved, it is obvious that a sound analysis based on reliable data helps to inform stakeholders about the scope and significance of the problem.

So far, three major strains of research have emerged to identify the workload, defined as the amount of physical and mental efforts required to perform farming tasks such as planting, weeding, harvesting, irrigation, and animal care, measured over a day or a year:

- **Interviews with farmers**: These are interactions about the challenges farmers face (Rocha et al., 2015). This strand of literature includes surveys addressing farm managers' workloads in general (Harun, 2014; Brennan et al., 2022) or with regard to specific aspects of their work life (Mack et al., 2019).
- **In-depth qualitative studies**: These focus on individual experiences of workload (Kauke et al., 2010; Seong et al., 2025), sometimes including physiological measurements such as heart rate monitoring (Groborz and Juliszewski, 2013; Quendler et al., 2017).
- **Model-based approaches**: A few scholars have developed models to represent farmers' workloads. For example, Pawlak and Maksim (2018) used Bayesian Networks to explore issues such as body posture and physical exertion. The calculation of farm labour time by Umstätter et al. (2022), as mentioned earlier, also falls into this category.

It is one-sided to solely rely on the interaction with farm managers to identify the objective workload on farms. On the one hand, farmers may not realize how much time they spend on their farm. On the other hand, they may exaggerate reported work hours to press for additional public support. Therefore, any "objective" appraisal of farmers' workload should be a welcome supplement to subjective reports. However, the limited sample in the study by Umstätter et al. (2022) of just 30 farms leaves the question open whether the farms chosen by her were sufficiently representative for Swiss (or even European) agriculture. This gap has motivated the study as described subsequently. Although we drew from quantitative labour science as described by Moriz (2007), we felt that this body of knowledge was largely untapped for the debate around social sustainability in agriculture.

Swiss family farms appear as a convenient case study to explore the potential of labour science for estimations of workload and eventually an important aspect of social sustainability. The entire country is strongly dominated by relatively small family farms for which the workload is more easily estimated than for other agricultural systems like commercial farms or slash and burn agriculture. The homogeneity of the country in terms of agricultural structure helps to find generalizable results.

3. Data preparation

To examine the workload in Swiss agriculture, we compared the working time requirement (WTR) with the available working hours of employees on farms. To calculate the WTR, we used the online application "LabourScope" (LS), the successor tool of the ART-AV software. LS was developed by Agroscope (Ettenhausen, Switzerland; Heitkämper et al., 2020) and was recommended for SIW calculations by Umstätter et al. (2022). LS provides a database of so-called work processes (WP) for many farm tasks that include various mechanization variants (e.g., milking in herringbone milking parlour) and the associated time requirements. Based on a survey among Swiss farms (Groher et al., 2020), LabourScope assumes likely mechanizations for individual farms based on their geographical location and estimates labour times per hectare or per animal on this basis. The tool allows to calculate the working time requirement at farm level, including office work. Aggregated WPs form production processes (PP) such as dairy cow husbandry. To enable automated WTR queries from LS, a dedicated interface was developed. Instead of calculating the WTR manually for each farm in the sample, we used annual panel data at the farm level - such as land use and livestock numbers - for the year 2023, provided by the Federal Office for Agriculture (FOAG). The FOAG collects the data in the context of the management of direct payment programs, called agricultural policy information system (AGIS). Using a mapping process, the farm areas and animal counts from the AGIS dataset were linked to corresponding PPs in LabourScope. Where no exact match was available, a similar PP was assigned. These assignments were made based on data analysis and consultations with experts. An overview of all assignments is provided in Appendix A. While LabourScope also includes housework on the farm, this was not included in this study.

One challenge was integrating the amount of work being carried out by contractors. While AGIS does not record contractor labour hours per farm, the **Swiss Farm Accountancy Data Network (FADN)**—specifically its *Farm Management Sample* (Renner et al., 2019)—includes information on the monetary amount spent on contractors at the farm level. We used this expenditure data to estimate the number of labour hours [MPh[1]] covered by contractors by dividing the amount spent (in CHF) by **CHF 100/hour**, which serves as an estimated average rate for contracted tasks. This figure was derived from expert interviews with the authors of Bütler and Gazzarin (2023). The estimated hours were then subtracted from the workload calculated by LS.

To compute the SIW, the labour time requirements (in MPh) as described above were to be divided by the available labour force (in MPh). The FADN dataset contains a self-declaration by farm managers regarding both family and non-family workers which were added to the labour units covered by contractors. Farm managers record each person who has worked on the farm and total the number of days worked. According to FADN guidelines, farm managers must declare all workers (family and non-family) who work **280 days per year or more** as full-time workers. Workers contributing fewer than 280 days are declared as a fraction of a full-time equivalent.

4. Data selection and processing

It is straightforward to address Research Question I - the share of farms in the different workload categories – by simply grouping the SIW values. Research Question II, which explores the factors driving workload, requires a more detailed specification. To run a regression explaining the farms' individual SIW values, it is necessary to define variables likely to influence workload, as summarized in Table 1.

[1] MPh = Manpower hours.

Table 1
Descriptive statistics of multivariate analysis.

Shorthand for the variable	Meaning of the variable	Measurement	Mean	Min	Max
Dependent variable					
SIW	Sustainability Indicator for Workload	Ratio between needed and available labour resources	1.12	0.27	4.63
Independent variables: Farm types					
Arable	Arable farm	1 – yes 0 - no	0.019	0	1
Dairy	Dairy farm	1 – yes 0 - no	0.397	0	1
Suckler	Suckler cow farm	1 – yes 0 - no	0.092	0	1
Cattle	Cattle farm	1 – yes 0 - no	0.087	0	1
Granivore	Granivore farm	1 – yes 0 - no	0.046	0	1
Granicomb	Combined granivore farm	1 – yes 0 - no	0.214	0	1
Combined	Combined farm	1 – yes 0 - no	0.094	0	1
Independent variables: Farm characteristics					
Income	Household income	Francs per year	106602	−93975	673656
Size	Farm size	Hectares	25.8	0	133
Organic	Production system	1 – organic 0 - conventional	0.166	0	1
Hill	Farm in hill zone	1 – yes 0 - no	0.314	0	1
Mountain	Farm in mountain zone	1 – yes 0 - no	0.270	0	1
Sharecontract	Share of contracted workers on total labour	Contracted year labour units/total year labour units	0.049	0	0.300
Sharehired	Share of hired workers on total labour	Hired year labour units/total year labour units	0.208	0	0.854

The farm type, in terms of its production portfolio, certainly plays an important role. Brennan et al. (2022), for example, found that farm managers of dairy farms experience higher levels of overwork than farm managers of other farm types. In addition to animal-related factors—such as the need for daily attention—**diversification** may also contribute to increased workload, as suggested by Schanz et al. (2023). In any case, the typology usually used in Switzerland to classify farms (Hoop and Schmid, 2020) seems a convenient base to identify systematic differences between farm types. This excludes farm types that are not present in the sample because they are usually unwilling to share their financial data (such as farms producing fruits and vegetables), or because their relative importance for Swiss agriculture as a whole is negligible (such as sheep or goat farms).

Beyond farm type, several **additional characteristics** may influence workload. A key question concerns the relationship between a farm's **income situation** and its workload. Is there a trade-off between adequate income and balanced labour organization, as suggested by the "**time squeeze**" hypothesis (Sawhill and Guyot, 2020)? This would imply that family labour is stretched beyond sustainable levels in order to secure a livelihood—suggesting a **positive correlation** between income and SIW, where only overworked farmers can achieve financial success. Conversely, one could hypothesize that **wealthier farmers can afford to hire** employees or contractors, potentially leading to a **negative correlation** between income and SIW. Related to income, farm size could influence a farm's workload, for example through necessitating additional work with additional resources, as suggested by Junquera et al. (2022). The numerator (i.e. labour requirements) of large farms will be necessarily higher than of small farms, and if the availability or affordability of external labour is an issue, this can lead to a higher SIW.

Organic farming is another factor frequently associated with higher labour demands. Studies have repeatedly shown that organic farming requires more work than conventional methods (Orsini et al., 2018; Schanz et al., 2023) and that individuals working on organic farms tend to work longer hours (Desai and Sumangala, 2016; Reissig et al., 2016). It is therefore necessary to distinguish between organic and conventional farms in the analysis. In Switzerland, the distinction between mountain and lowland agriculture is also a frequent subject of debate. As the workload on mountain farms is occasionally depicted as problematic (Petit et al., 2006; Jurt et al., 2015), it is advisable to control for systematic differences between the different agricultural systems.

Finally, the organization of labour may also have an impact on the workload of farms. It is obvious that external employees can solve the problem of overwork; on the other hand, their management introduces additional transaction costs (Schmitt, 1992). The same can be said for contractor labour which is especially relevant for arable farming. To operationalize the effects of these two forms of labour, the **shares of total farm labour** performed by external employees and contractors are included as an independent variable.

As the dependent variable was continuous and approximately normally distributed, the regression analysis could be carried out by the robust regression in STATA 17 (following Li, 1985) in order to reduce the effect of outliers. Robust methods have the advantage of estimating data corruption based on the entire data (Zhang et al., 2018) and is therefore often used in sustainability studies (e.g. Yu and Zhao, 2015; Sun and Xu, 2023; Sun and Zhang, 2025.) The regression was first run on the entire sample. To further examine the situation in the single sub-groups of underworked, sustainable, critical and overworked farm households, the regression was also applied to these sub-samples.

5. Results

5.1. Descriptive results

Fig. 1 displays the share of farms in the categories of workload as defined by Umstätter et al. (2022). Only 26 % of farmers fall in the range that is classified as sustainable. The figures also confirm that overwork is a far more severe problem than underwork which only affects a tenth of farmers in the sample. By contrast, one third of farmers falls in the category of clear overwork.

A description of the four groups in terms of their SIW means and the independent variables is provided in Appendix B.

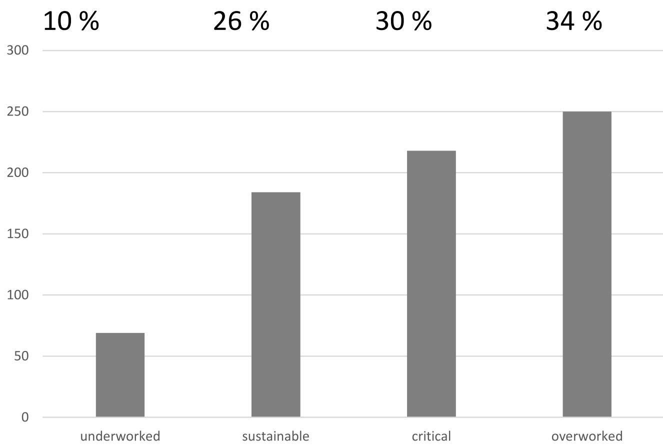

Fig. 1. Relative share of Swiss farms in the four workload categories included in SIW (n = 721).

5.2. Econometric results

Table 2 indicates some of the causes of the variance in workload for the entire population of farm households and for the sub-groups. The results show that farm types definitely have an impact. Both diversification - represented by one of the combined farm types - and a focus on animal production seem to increase the SIW. While suckler cow farms are a notable exception, the value of SIW on a combined granivore farms is, on average, 0.4 points higher than on average. Arable farms exhibit the lowest SIW, except in the underworked group where suckler cow farms may experience lower workloads.

Farm size and income generally do not impact SIW. Whether a farm is small or large, or has a high or low income, does not tell anything about the balance between labour requirements and labour resources. The fact that organic farms have a negative coefficient should probably not be overemphasized, as the interface (described in Appendix A) cannot fully account for the specific labour demands of organic production. However, in the case of organic agriculture, it is helpful to take a closer look at the sub-groups. Underworked organic farm households are less underworked (positive coefficient) than their conventional counterparts—an effect that is reversed in the overworked sub-group. And although there are many important differences between lowland and mountain farms in Switzerland, the results clearly indicate that workload is not one of them.

The way in which a farm utilizes labour has a clear impact on SIW. However, the effects of employed labour and contracted labour run in opposite directions. Farms that rely on employees have a more manageable workload than those that rely on contractors. The negative effect of contracted labour is especially pronounced within the group of overworked farm households. The push towards overwork caused by the use of contractors is ten times stronger than that associated with hired labour (although it must be admitted that the share of contracted work usually is on a much lower level than the share of hired labour; see Table 1).

6. Discussion and conclusions

The first finding of this study was the verification that a major share of farms are overworked. Around **one-third** of farms experience more than **20 % work overload**, with nearly another third falling into the **critical** zone. These findings support the growing body of research focusing on farmers experiencing high levels of stress (eg. McDonald et al., 2022; Rosmann, 2024). While Solly (2018) is arguing that we need to slow down society, this seems to apply to farming more than to most other sectors.

The regression analysis provides some clues about which factors contribute to overwork and which do not. While farm size and income – perhaps counterintuitively – do not play a significant role, it is evident that husbandry is more likely to lead to overwork than crop farming. The same is true for diversified farms: while diversified farms may be more interesting to manage (Besser and Mann, 2015) and tend to buffer existing risks (Tacconi et al., 2022), they do not only generate less income (Chen et al., 2024), but also produce more overwork. We therefore concur with the publications that recommend only diversifying farms to a manageable extent (e.g. Ulukan et al., 2022).

Finally, it is an unexpected result that the different ways of external labour have opposite effects on the SIW. This is illustrated by the descriptive results in Appendix B: 16 per cent of the work on overworked farms is carried out by employees and 4 per cent by contractors. On underworked farms, the corresponding figures are 29 and 2 per cent, respectively. And it is likely that economic considerations contribute to an explanation: Engaging contractors (remember the 100 Fr./h taken from expert interviews for our calculations) costs much more per hour than engaging employees, where 21 Francs per hour are a typical rate of pay (Mann, 2024). It is obvious that employers will be more careful in their decisions to engage contractors than employees. Additionally, employees in Swiss agriculture are often hired on a monthly base, and

Table 2
Results of the regression analysis.

Variable	Complete	Underworked	Sustainable	Critical	Overworked
Arable	**−0.279[b] (0.006)**	−0.122[b] (0.006)	−0.014 (0.770)	−0.098[c] (0.030)	−0.044 (0.750)
Dairy	**0.285[a] (0.000)**	−0.006 (0.840)	0.063[c] (0.027)	0.028 (0.514)	0.197[c] (0.020)
Suckler	**−0.116 (0.133)**	−0.934[b] (0.007)	0.045 (0.197)	−0.010 (0.836)	0.070 (0.620)
Cattle	**0.120 (0.166)**	−0.040 (0.248)	0.069[c] (0.036)	0.002 (0.962)	0.307 (0.183)
Granivore	**0.392[a] (0.000)**	−0.043 (0.140)	0.065[c] (0.090)	0.060 (0.207)	0.421[b] (0.007)
Granicomb	**0.391[a] (0.000)**	−0.054[d] (0.050)	0.020 (0.560)	0.039 (0.356)	0.293[b] (0.003)
Combined	**0.294[b] (0.002)**	0.015 (0.697)	0.011 (0.560)	−0.017 (0.651)	0.419[b] (0.004)
Income	**0.000 (0.551)**	−0.000[c] (0.013)	0.000 (0.831)	0.000 (0.896)	0.000 (0.877)
Size	**0.002 (0.291)**	0.002[d] (0.055)	0.001[d] (0.070)	0.000 (0.428)	−0.004 (0.242)
Organic	**−0.107[b] (0.008)**	0.045[c] (0.029)	−0.051[b] (0.001)	−0.006 (0.682)	−0.033 (0.664)
Hill	**0.029 (0.488)**	0.049[c] (0.044)	−0.006 (0.758)	−0.022 (0.154)	−0.025 (0.713)
Mountain	**−0.006 (0.901)**	−0.007 (0.801)	−0.002 (0.929)	−0.009 (0.639)	0.115 (0.243)
Sharecontract	**5.61[a] (0.000)**	−0.291 (0.606)	0.694[d] (0.058)	0.846[d] (0.064)	3.31[b] (0.001)
Sharehired	**−0.560[a] (0.000)**	−0.075[d] (0.084)	0.012 (0.731)	−0.050 (0.150)	−0.221 (0.230)
R^2	**0.26**	0.40	0.13	0.09	0.12

Table displays regression coefficients; p-values in parentheses.
[a] $p < 0.001$.
[b] $p < 0.01$.
[c] $p < 0.05$.
[d] $p < 0.1$.

this allows for a more generous labour organization. By contrast, contractors are usually hired by the day or even hour. In a nutshell, the employment of workers provides much more leeway and buffer capacity, which protect farming families from overwork than the engagement of contractors in agriculture.

While the validity of these results is confined to Swiss agriculture, the methodology is not. LabourScope can be applied to all farms and farm types, even though some time estimations may have to be revised for farm sizes or technologies missing in Switzerland. It is therefore promising to extend the application of the SIW indicator internationally. In this way, the tools of traditional labour science can increasingly be used for indicators on social sustainability.

There are no signs that overwork-related problems in agriculture will be resolved. However, the contribution of academics should be to identify stressors and subsequently also pathways to reduce their effect. This study has contributed to the former, but similar approaches applied to family farms and other agricultural systems would certainly help to consolidate the understanding of overwork in agriculture.

Swiss policymakers should be alerted by the results of the analysis. The high prevalence of overwork will require public measures that increase the availability and decrease the costs of external labour so that the work-life balance of Swiss farms can be brought to an equilibrium. Targeted labour support schemes would have the potential to mitigate the problem.

Nevertheless, the method applied in this study has many limitations. One of them is that it confined itself to the quantity of work, whereas the quality of work is at least equally important, particularly when referring to the wording of SDG 8 (“decent work”). If the work on the farm is meaningful, it is easier to manage and support overtime. However, even within the realm of pure quantitative workload, there are limitations affecting both the numerator and the denominator of the SIW. The denominator, representing the available workforce, relies on realistic self-reported data from farming families, which are assumed to be realistic for use in agricultural statistics. If the farm manager fails to list the wife’s work, for example, although she spends most of the day with farm work, this would distort the results. The numerator, the modelled work requirement, is based on strong assumptions about the technologies used on the farm and on geographic conditions like field sizes and slopes. Despite these numerous sources of potential bias, the number and credibility of the explanatory variables suggest that the individual SIW values reflect at least some meaningful insight about the farm’s workload.

CRediT authorship contribution statement

Stefan Mann: Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Formal analysis. **Katja Heitkämper:** Writing – review & editing, Writing – original draft, Formal analysis. **Daniel Hoop:** Investigation, Data curation.

Declaration of competing interest

All authors declare that they have no conflict of interest connected to the submitted paper.

Appendix

A: Mapping of the LabourScope data and the AGIS structural farm data

Arable farming

Most arable crops that do not have an identical PP in LabourScope were assigned either to winter wheat or oilseed rape. All renewable raw materials are treated like grassland with a single cut.

Forage Production

AGIS records various types of meadows and pastures, as well as their slope gradient, whereas LabourScope differentiates pastures only by slope and fertilization, and meadows by slope, number of cuts, and processing method. There are distinct production methods for hay and silage, which differ in the number of cuts. Furthermore, there are PPs for new sowings, both with and without a cleaning cut, as well as for fertilized and unfertilized pastures.

The linking of meadows, pastures, and other green areas from AGIS to a LabourScope PP is based on a fixed assignment using their attributes. These are defined as follows:

- **Extensive** = 2 cuts
- **Medium intensive** = 3 cuts
- **Other** = 4 cuts

For meadows without these attributes, the number of cuts is determined through expert assessment. A defined number of cuts is specified for all meadow procedures. Artificial meadows are a special case, as the number of cuts cannot be determined uniformly. Therefore, the PPs for one, two, and three cuts are each weighted as one-third.

Since AGIS data does not indicate whether a farm stores fodder as hay or processes it into silage, the distribution is determined using a mixed calculation based on slope inclination:

Slope	Share of Hay (%)	Share of Silage (%)
0–35 %	50	50
35–50 %	75	25
>50 %	100	0

Domestic Farming

Most animal species can be linked via a 1:1 assignment. However, cattle farming is more complex. Farms that keep niche animal species such as emus or deer are not included, as no comparable LS-PPs exist for them. Animal species without a suitable LS-PP, and for which only a minimal amount of work is required, are still taken into account, but no working time requirement (WTR) is attributed. An example would be a ram (AGIS code X2355).

Cattle Farming

In cattle farming, AGIS and LabourScope also differ structurally. The challenge lies in distributing the limited AGIS codes sensibly across the more detailed LS-PPs. For simplicity, all dairy cattle farms are assumed to be hay farms, as the WTR for silage farms is only slightly higher.

The distribution between tie-stalls and loose housing is based on statistical surveys and estimates from Agristat (2021), which show that 55.7 % of farms use tie-stalls, and 44.3 % use loose housing. Accordingly, the PP for tie-stalls is multiplied by 0.557 and added to 0.443 times the PP for loose housing. If a farm participates in the BTS program, it is assumed to use loose housing only, so the mixed calculation is skipped in favor of the loose housing method.

Labor requirements in mountain areas are higher for various reasons. Therefore, the annual work units (AW) are differentiated across zones (valley, hill, and mountain zones I–IV). These zones align between AGIS and LabourScope and can thus be directly applied. One exception is the hill zone, which is grouped with the valley zone.

Whether a farm engages in summer grazing is determined by the farming type. Calculations use the average number of animals on the farm for both year-round and summer grazing systems.

The AGIS code *"Other cows"* is assumed to mainly refer to suckler cows, and is thus assigned accordingly. There is only one PP for playpens, which is standard for such animals. We distinguish between hay-based and silage-based systems, with the mechanization survey providing the relevant data. We assume an equal (50/50) distribution in the valley and a 75/25 distribution in mountain areas. The corresponding PPs are added proportionately. Summer grazing and zone assignment follow the same principles as with dairy cattle.

The various cattle age groups in AGIS are mapped to the respective age groups in LabourScope. Only animals up to 160 days are assigned to the PP *"Calves 14–160 days."* Labour time requirements based on AGIS codes tend to be overestimated because they include less intensive fattening cattle. As with suckler cows, all cattle are assumed to be kept in loose housing systems, with differentiation only by zone and feeding type, using the same logic as for suckler and dairy cows.

Other Animal Species

Most other animals can be directly assigned. One exception is the AGIS PP *"Non-lactating breeding sows over* 6 months *old (approx. 3 turns* per *place)."* Since it is unclear whether these animals are in the service or waiting area, we apply a proportional calculation. According to Eichhorn (1999), the ratio of service to waiting areas is approximately constant at 38:62, regardless of farm size or animal numbers. Therefore, we use the following formula:

$$\text{Non-lactating breeding sows } [\ldots] = 0.38 \times \text{“Sows in the service center”} + 0.62 \times \text{“Sows in the gestation pen”}$$

The same approach was used for other PPs, such as roughage share for cattle.

The WTR for organic farming was calculated by multiplying the WTR for conventional PPs by a factor of **1.2**.

B: Descriptive Statistics of Sub-groups

Variable	Underworked	Sustainable	Critical	Overworked
SIW	0.51	0.76	1.04	1.62
Arable	0.04	0.03	0.01	0.01
Dairy	0.27	0.36	0.48	0.40
Suckler	0.35	0.14	0.05	0.02
Cattle	0.14	0.11	0.10	0.04
Granivore	0.01	0.04	0.03	0.07
Granicomb	0.09	0.16	0.19	0.31
Combined	0.07	0.09	0.09	0.11
Income	101,032	102,920	103,078	113,797
Size	25.4	24.8	27.2	25.4
Organic	0.23	0.22	0.17	0.11
Hill	0.26	0.26	0.33	0.36
Mountain	0.46	0.34	0.26	0.17
Sharecontract	0.02	0.02	0.03	0.04
Sharehired	0.29	0.24	0.22	0.16

Data availability

Data will be made available on request.

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