Comparison of fertility traits, health traits and health -related management routines of Swiss dairy farms with long versus short productive lifespan profiles

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SUPPLEMENTARY FILE

Methodology description: Detailed description of the farm selection procedure and resulting characteristics of data sets

The aim of the sampling method was to identify and compare two groups of farms that were representative of the overall structure of the Swiss dairy sector, but had extremely long versus extremely short productive lifespan profiles of their dairy herds. The final objective was the selection of 30 representative farms for farm visits; 15 with a short productive lifespan profile and 15 with a long productive lifespan profile. For this purpose, Switzerland was divided into 15 study regions, representing the diversity of Swiss dairy production. The sampling method is explained in detail as follows.

First, Switzerland was divided into its administrative subdivisions (cantons). Due to its large size, the canton of Berne was further divided into its administrative districts. Then, based on Swiss agricultural census data (BfS, 2020), as well as the annual statistics of the three main Swiss dairy herdbooks (Braunvieh Schweiz (BVCH), 2020; Swissherdbook (SHB), 2020; Holstein Switzerland (HOCH), 2020), we determined the following descriptive statistics for each canton and Bernese district for a total of 25,007 dairy farms: average dairy herd size, predominant production zone, prevalence of organic dairy farms, and predominant dairy cow breed.

Herd size: In Switzerland herd size ranged from 9.8 dairy cows per farm in Uri, to 34.7 dairy cows per farm in Neuchâtel, with a national average of 22.2 dairy cows per farm. We defined three categories of herd size: small dairy herds below 20 cows, medium dairy herds between 20 and 29 cows, and large dairy herds equal or above 30 cows.

Production zone: The Swiss ministry of agriculture distinguishes six production zones: valley, hill, and mountain 1 to 4. The valley zone and the hill zone comprise jointly around half (49%) of all dairy farms, and are grouped into one category by the major Swiss breeding organizations (BVCH and SHB). We followed this same approach and defined two production zones: valley and hill zone vs. mountain zone 1 to 4. We then categorized cantons and districts with an average share of farms in the valley and hill zone of more than 49% as valley, and those with an average share equal or below 49% as mountain.

Production system: On average 13.3% of Swiss dairy farms were organic. We categorized cantons and districts with an average share of organic dairy farms greater than 14% as organic, and those with an average share less than 14% as conventional.

Predominant breed: The annual statistics of the herdbooks BVCH, SHB and HOCH revealed that the five predominant dairy cow breeds in Switzerland are Brown Swiss (BS), Holstein (HO), Swiss Fleckvieh (SF), Simmental (SI) and Original Braunvieh (OB). Within the herdbooks, these breeds are identified by the codes BV and BS for Brown Swiss, HO, RF and RH for Holstein, 60, 70 and SI for Simmental, and OB and ROB for Original Braunvieh. The average percentage of breeds present in each study region was calculated.

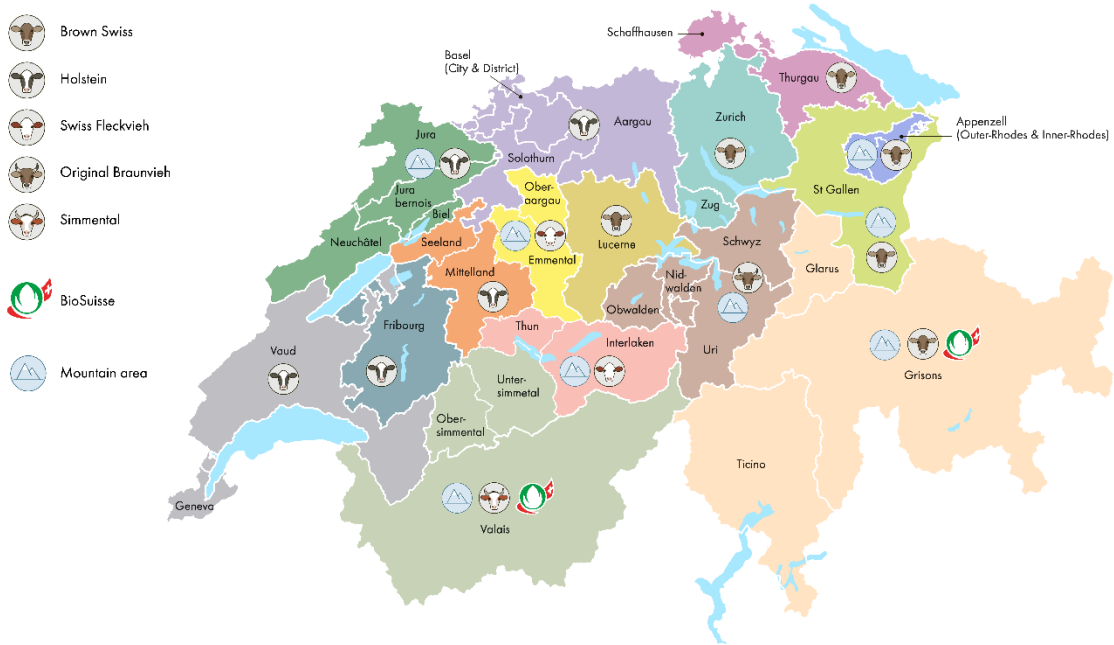
We then grouped cantons and districts with similar descriptive statistics and geographic proximity into 15 study regions, making sure that each study region would contain approximately the same number of dairy farms (1/15th of all Swiss dairy farms, Figure S1).

In a last step, we assigned fixed farm characteristics in terms of production zone, production system and breed to each of the 15 study regions. The fixed characteristics are depicted in Table S1 for each study region. It was made sure that the average of the study regions matched the Swiss national average. Production zone and system were assigned following the thresholds described above.

Assignment of breed to each study region was done as follows: as SI and OB were the smallest breeds present in this study, none of them did make up the majority of dairy herds in any of the study regions. Therefore, the study regions with the highest average share of the respective breed (SI or OB) were assigned to the respective breed, e.g. the study region with the highest share of OB cow was assigned to the breed OB (the same was true for SI). The remaining 13 study regions were then assigned to the breeds SF, BS and HO according to their proportion in the Swiss dairy population and their presence in the respective study region. This resulted in six study regions assigned to BS, five assigned to HO and two assigned to SF, respectively (Figure S1).

We obtained pairs of dairy farms from each study region, that resembled each other in terms of production zone, production system and breed and were representative of the national average (Table S2) but contrasted in terms of productive lifespan of the cows.

Figure S 1. Division of Switzerland into 15 study regions with characteristics assigned to each region in terms of production zone (valley/hill or mountain), production system (organic or conventional) and predominant breed



If the symbol for mountain area is not displayed in a study region, this region has been characterized as a valley region. If the BioSuisse label (labelling Swiss organic farming) is not displayed in a study region, the respective study region is assigned to a conventional production system.

Figure S 2. Overview on data origin, selection criteria, data selection rounds and resulting data sets in the study

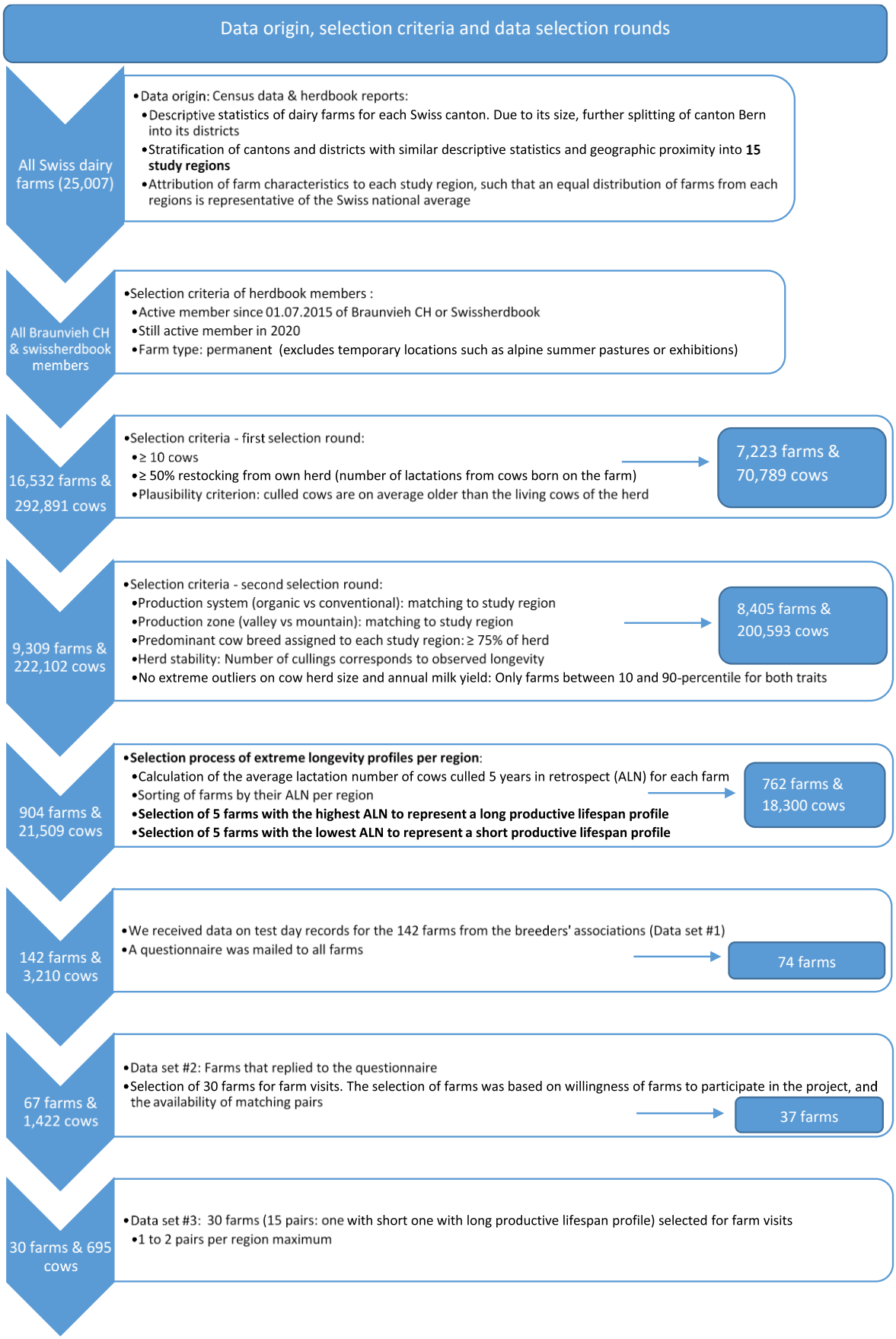


Table S1. Farm characteristics obtained from the herdbooks Braunvieh Schweiz and Swissherdbook (n= 16,532 farms), and characteristics assigned to each of the 15 defined study regions

Study region	Swiss Cantons and Districts[1]	Share of dairy farms (%)	Average herd size (cows)	Share of farms in valley/hill zone (%)	Assigned production zone	Share of organic farms (%)	Assigned production system	Farms with assigned breed (%)[2]	Assigned dairy breed[3]
1	Glarus, Grisons, Ticino	8	12.3	10	mountain	39	organic	67	BS
2	Uri, Schwyz, Obwalden, Nidwalden	11	11.9	22	mountain	14	conventional	10	OB
3	*Ober- & Untersimmental,* Valais	9	11.2	2	mountain	15	organic	41	SI
4	*Thun, Interlaken*	5	13.5	19	mountain	12	conventional	23	SF
5	Appenzell (Outer-Rhodes & Inner-Rhodes)	4	16.5	2	mountain	12	conventional	78	BS
6	St Gallen	11	17.1	46	mountain	12	conventional	67	BS
7	Zurich, Zug	6	22.4	78	valley/hill	13	conventional	49	BS
8	Aargau, Solothurn, Basel (City & District)	5	23.3	81	valley/hill	12	conventional	32	HO
9	Lucerne	9	17.8	54	valley/hill	8	conventional	40	BS
10	*Oberaargau, Emmental*	9	16.1	44	mountain	11	conventional	18	SF
11	*Mittelland, Seeland*	7	19.6	53	valley/hill	7	conventional	36	HO
12	Fribourg	5	25.3	60	valley/hill	7	conventional	52	HO
13	Vaud, Geneva	4	25.6	58	valley/hill	8	conventional	24	HO
14	Neuchâtel, Jura, *Jura bernois, Biel*	4	24.7	18	mountain	10	conventional	46	HO
15	Thurgau, Schaffhausen	4	26.8	96	valley/hill	12	conventional	51	BS
	Overall average	-	17.6	40	-	13	-	-	-

[1]Names in italics correspond to districts of the canton Berne, [2] Share of farms with ≥75% of herd belonging to assigned dairy breed (%), [3] Breed code with average presence of the breed in % provided in brackets: BS= Brown Swiss (34%), OB= Original Braunvieh (3%), SI= Simmental (6%), SF= Swiss Fleckvieh (7%), HO= Holstein (17%). 33% of the farms had no predominant breed.

Table S2. Proportion of farms per production zone, production system and predominant dairy breed in all Swiss dairy farms compared to the number and proportion of farms defined in the 15 study regions

Characteristic	Level	Swiss national average (%)	Number of study regions assigned to characteristic and level	Proportion of study regions assigned to characteristic and level (%)
Production zone	Valley/hill zones	49	7	47
Production system	organic	13	2	13
Predominant dairy breed[1]	BS	39	6	40
	HO	39	5	33
	SF	12	2	13
	OB	2	1	7
	SI	4	1	7

[1]Breeds: BS= Brown Swiss, HO= Holstein, SF= Swiss Fleckvieh, OB= Original Braunvieh, SI= Simmental

To select farms for the study, we received access to an anonymized data set of all members of the BVCH and SHB herdbooks. Members had to be active at least since 01.07.2015, still be active members on 30.06.2020 and be registered as permanent farms (excluding pure alpine summer farms). The data set included information on milk production, herd size and culling events during the five years between 01.07.2015 and 30.06.2020 for a total of 16,532 farms with 292,891 cows. The productive lifespan was defined as the average lactation number (ALN) of all cows culled during the five years observation period (2015 – 2020). The parameters describing each farm were the following:

- Location (city name and canton)
- Production zone (valley/hill, mountain 1/2, mountain 3/4)
- Membership in organic association (yes, no)
- Total number of standard lactations (250+ days) during the last 5 years (01.07.2015 – 30.06.2020)
- Number of standard lactations by breed (BV/BS, OB/ROB, HO/RF, RH, SF, 60/70/SI)
- Number of standard lactations from animals born on the farm (own restocking)
- For the animals having finished a standard lactation 250+ days:
    - Average productive lifespan (days)
    - Average lifetime production (kg milk)
    - Average lactation number
- Number of cows culled during the last 5 years (2015 – 2020)
- Number of cows culled by breed code (BV/BS, OB/ROB, HO/RF, RH, SF, 60/70/SI)
- Number of cows culled that were born on the farm (restocked animals)
- For the culled cows:
    - Average productive lifespan (days)
    - Average total lifespan (days)
    - Average lifetime production (kg milk)
    - Average lactation number

This data set was then reduced in three selection rounds to match the previously defined study regions and select farms for the study. A figure on this process is provided in Figure S2. In the first selection round, we excluded all farms that owned on average less than 10 cows, had restocked less than 50% of cows from their own herd, and whose average age of the culled cows was lower than the average age of the animals alive. In total 9,309 farms with 222,102 cows remained.

In a second selection round, we sorted all remaining farms according to their location, and assigned them to the previously defined 15 study regions. Farms whose production system, production zone and predominant breed (at least 75% of the dairy herd) did not match the predefined characteristics for the respective region were excluded. In each study region, we excluded the first and fourth quartile of farms, whose actual number of culling events differed from the replacement rate one should expect based on the average age of the culled cows. This was done to ensure herd stability and avoid the selection of strongly growing or shrinking herds. Furthermore, we calculated the average milk yield and herd size for each study region. To exclude extreme outliers, we selected farms within the 10th and 90th-percentile for both milk yield and herd size. In total, 904 farms with 21,509 cows were kept for further analyses. Their main characteristics are presented in Table S3.

Table S3. Number of selected dairy farms (n farms), average herd size, average lactation number at culling (ALN), average daily milk yield during the productive lifespan (Ø DMY_PL) and average daily lifetime production (Ø DMY_LT) per study region for the 904 dairy farms included in the last selection round

Study region[+]	Swiss Cantons and Districts[++]	n farms	Ø herd size	ALN	Ø DMY_PL (kg)	Ø DMY_LT (kg)
1	Glarus, Grisons, Ticino	50	16.6	4.1	16.8	10.3
2	Uri, Schwyz, Obwalden, Nidwalden	10	15.5	4.9	16.9	10.3
3	*Ober- & Untersimmental,* Valais	16	14.1	4.8	15.5	9.7
4	*Thun, Interlaken*	24	16.4	4.9	17.8	11.5
5	Appenzell (Outer-Rhodes & Inner-Rhodes)	115	19.1	4.2	19.6	11.4
6	St Gallen	126	17.6	4.3	18.8	11.2
7	Zurich, Zug	81	27.1	4.5	20.4	12.9
8	Aargau, Solothurn, Basel (City & District)	60	29.4	4.0	23.1	14.6
9	Lucerne	72	24.9	4.6	19.7	12.7
10	*Oberaargau, Emmental*	39	14.3	4.5	18.2	12.1
11	*Mittelland, Seeland*	72	25.5	3.9	23.7	13.5
12	Fribourg	79	30.6	3.6	21.9	12.7
13	Vaud, Geneva	32	34.2	3.5	22.3	12.7
14	Neuchâtel, Jura, *Jura Berneois, Biel*	61	29.4	3.7	20.3	11.7
15	Thurgau, Schaffhausen	67	30.5	4.6	21.6	13.6
	Total	904	23.8 (± 9.4)	4.3 (± 1.3)	20.2 (± 2.6)	12.1 (± 2.0)

[+]Further information on the characteristics (production zone, production system, dairy breed) of each study region can be found in Table S1 [++] Names in italics correspond to districts of the canton Berne.

In a third selection round, we calculated the productive lifespan based on the ALN of all cows culled five years retrospectively (i.e.2015-2020). We sorted the remaining farms within each region by their ALN, and selected the 5 farms with the longest and the 5 farms with the shortest ALN as representative farms with extreme productive lifespan profiles per region. Therefore, the range of ALN representing a long or a short productive lifespan profile varied for each study region. Within each study region, farms with short productive lifespan profiles had to differ from farms with long profiles by at least one lactation. Otherwise, we further removed farms until the objective was met. In the final selection 142 farms with 3,120 cows distributed over the 15 study regions remained. The main characteristics of this data set are presented in Table S4.

For the 142 selected farms, we received test day records data from the breeders associations. All of the 142 farms were invited by their respective breeders association to participate in a questionnaire. Sixty-seven farms responded to the questionnaire and 64 provided useful copies of their medical treatment journals. The main characteristics of the 67 farms are presented in Table S5. Lastly, among the farms that responded to the questionnaire, we selected 15 pairs of farms for farm visits. Each pair was composed of one farm with a short and one farm with a long productive lifespan profile from the same or a similar study region. This resulted in 30 farm visits. The main characteristics of this data set can be found in Table S6.

A summary of the development of the average main characteristics through data selection rounds is presented in Table S7.

Table S4. Number of selected farms (n farms), average lactation number at culling (ALN) and average daily lifetime production (Ø DMY_LT) of farms with contrasting productive lifespan profiles by study region for 142 dairy farms selected for the study

Study region[+]	Swiss Cantons and Districts[++]	n farms	Ø ALN	Farms with short productive lifespan profile (n=70)		Farms with long productive lifespan profile (n=72)		Difference in ALN (c-a; lactations)	Difference in Ø DMY_LT (d-b; kg)
				a. Ø ALN	b. Ø DMY_LT (kg)	c. Ø ALN	d. Ø DMY_LT (kg)		
1	Glarus, Grisons, Ticino	10	4.1	3.2	9.1	5.1	11.5	1.9	2.3
2	Uri, Schwyz, Obwalden, Nidwalden	7	4.9	3.7	9.7	6.4	11.3	2.7	1.6
3	*Ober- & Untersimmental,* Valais	10	4.8	4.0	9.6	5.5	9.8	1.5	0.2
4	*Thun, Interlaken*	9	4.9	3.8	10.5	5.9	12.3	2.1	1.8
5	Appenzell (Outer-Rhodes & Inner-Rhodes)	10	4.2	2.8	10.0	5.5	12.7	2.7	2.7
6	St Gallen	10	4.3	2.8	9.6	5.8	12.8	3.0	3.2
7	Zurich, Zug	10	4.5	3.0	12.2	6.0	13.6	3.0	1.4
8	Aargau, Solothurn, Basel (City & District)	10	4.0	3.2	13.4	4.8	15.7	1.6	2.3
9	Lucerne	10	4.6	3.0	11.8	6.2	13.7	3.2	1.9
10	*Oberaargau, Emmental*	10	4.5	3.3	10.7	5.6	13.5	2.3	2.9
11	*Mittelland, Seeland*	10	3.9	2.8	12.2	5.0	14.8	2.2	2.6
12	Fribourg	9	3.6	2.7	11.2	4.3	13.8	1.5	2.3
13	Vaud, Geneva	10	3.5	2.8	11.5	4.2	13.9	1.4	2.4
14	Neuchâtel, Jura, *Jura ois, Biel*	9	3.7	2.9	10.6	4.7	13.1	1.8	2.5
15	Thurgau, Schaffhausen	8	4.6	3.2	11.6	5.4	14.7	2.3	3.2
	Total	142	4.3	3.1 (± 0.4)	10.9 (± 1.4)	5.3 (± 0.8)	13.2 (± 1.8)	2.2	2.3

[+]Further information on the characteristics (production zone, production system, dairy breed) of each study region can be found in Table S1. [++] Names in italics correspond to districts of the canton Berne.

Table S5. Number of selected farms (n farms), average lactation number at culling (ALN) and average daily lifetime production (Ø DMY_LT in) of farms with contrasting productive lifespan profiles by study region for the 67 dairy farms that participated in the questionnaire

				Farms with short productive lifespan profile (n=31)		Farms with long productive lifespan profile (n=36)			
Study region+	**Swiss Cantons and Districts++**	**n farms**	**Ø ALN**	**a. Ø ALN**	**b. Ø DMY_LT (kg)**	**c. Ø ALN**	**d. Ø DMY_LT (kg)**	**Difference in ALN (c-a; lactations)**	**Difference in Ø DMY_LT (d-b; kg)**
1	Glarus, Grisons, Ticino	3	3.7	3.1	9.3	4.9	11.3	1.8	2.0
2	Uri, Schwyz, Obwalden, Nidwalden	2	3.6	3.6	10.4	N/A	N/A	N/A	N/A
3	*Ober- & Untersimmental,* Valais	8	4.6	4.0	9.6	5.6	9.9	1.6	0.3
4	*Thun, Interlaken*	5	5.1	3.7	11.1	6.0	12.0	2.3	0.9
5	Appenzell (Outer-Rhodes & Inner-Rhodes)	5	4.6	2.8	10.7	5.8	13.5	3.0	2.8
6	St Gallen	7	4.9	2.8	9.7	5.8	12.8	3.0	3.2
7	Zurich, Zug	5	4.1	2.9	12.5	5.8	14.4	2.9	1.9
8	Aargau, Solothurn, Basel (City & District)	5	4.2	3.4	13.5	4.8	15.6	1.5	2.2
9	Lucerne	6	5.2	3.0	11.4	6.3	14.0	3.3	2.6
10	*Oberaargau, Emmental*	7	4.2	3.3	10.8	5.3	13.7	1.9	2.9
11	*Mittelland, Seeland*	4	3.9	2.6	12.3	5.2	15.2	2.6	2.9
12	Fribourg	1	4.5	N/A	N/A	4.5	12.8	N/A	N/A
13	Vaud, Geneva	4	3.6	2.9	11.0	4.4	14.3	1.5	3.3
14	Neuchâtel, Jura, *Jura bernois, Biel*	1	4.6	N/A	N/A	4.6	13.2	N/A	N/A
15	Thurgau, Schaffhausen	4	4.9	3.0	11.0	5.5	14.8	2.4	3.7
	Total	67	4.5	3.3 (± 0.5)	10.9 (± 1.4)	5.5 (± 0.6)	13.4 (± 1.8)	2.2	2.5

+Further information on the characteristics (production zone, production system, dairy breed) of each study region can be found in Table S1. ++ Names in italics correspond to districts of the canton Berne.

Table S6. Number of selected farms (n farms), average lactation number at culling (ALN) and average daily lifetime production (Ø DMY_LT in kg milk) of farms with contrasting productive lifespan profiles by study region for the 30 dairy farms visited during the study

				Farms with short productive lifespan profile (n=15)		Farms with long productive lifespan profile (n=15)			
Study region[+]	**Swiss Cantons and Districts[++]**	**n farms**	**Ø ALN**	**a. Ø ALN**	**b. Ø DMY_LT (kg)**	**c. Ø ALN**	**d. Ø DMY_LT (kg)**	**Difference in ALN (c-a; lactations)**	**Difference in Ø DMY_LT (d-b; kg)**
1	Glarus, Grisons, Ticino	2	4.1	3.2	11.3	4.9	14.7	1.7	3.4
2	Uri, Schwyz, Obwalden, Nidwalden	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	*Ober- & Untersimmental,* Valais	2	4.4	3.7	9.6	5.2	17.9	1.5	8.4
4	*Thun, Interlaken*	2	4.9	3.8	9.7	6.1	10.4	2.3	0.8
5	Appenzell (Outer-Rhodes & Inner-Rhodes)	1	5.3	N/A	N/A	5.3	16.0	N/A	N/A
6	St Gallen	3	3.9	2.8	11.3	6.1	13.5	3.3	2.2
7	Zurich, Zug	3	3.9	2.8	12.1	6.1	11.0	3.3	-1.1
8	Aargau, Solothurn, Basel (City & District)	4	4.2	3.4	9.7	5.0	13.9	1.6	4.2
9	Lucerne	2	5.2	2.9	13.0	7.4	12.8	4.5	-0.2
10	*Oberaargau, Emmental*	2	4.4	3.3	12.2	5.5	10.8	2.2	-1.4
11	*Mittelland, Seeland*	2	3.7	2.7	15.2	4.8	14.1	2.2	-1.1
12	Fribourg	1	4.5	N/A	N/A	4.5	11.3	N/A	N/A
13	Vaud, Geneva	3	3.4	2.9	12.5	4.4	13.2	1.5	0.6
14	Neuchâtel, Jura, *Jura bernois, Biel*	2	3.7	2.9	14.4	4.6	12.1	1.8	-2.3
15	Thurgau, Schaffhausen	1	5.6	N/A	N/A	5.6	14.8	N/A	N/A
	Total	30	4.2	3.1 (± 0.3)	11.8 (± 1.7)	5.4 (± 0.8)	13.4 (± 2.0)	2.3	1.6

[+]Further information on the characteristics (production zone, production system, dairy breed) of each study region can be found in Table S1. [++] Names in italics correspond to districts of the canton Berne.

Table S7. Development of number of dairy farms (n farms), and mean value (± standard deviation) of average lactation number at culling (ALN), average daily milk yield during productive lifespan (Ø DMY_PL) and average daily lifetime production (Ø DMY_LT) by data sets obtained through selection rounds

Variable	Data set					
	All farms	After selection round #1	After selection round #2	Final selection	Questionnaire participants	Farm visits
n farms	16,532	9,309	904	142	67	30
Herd size (cows per farm)	17.6 ± 13.7	23.9 ± 13.7	23.8 ± 9.4	22.6 ± 9.1	21.2 ± 8.1	23.2 ± 9.1
ALN (lactation)	4.1 ± 1.1	4.1 ± 0.8	4.0 ± 0.8	4.2 ± 1.3	4.4 ± 1.3	4.2 ± 1.3
Ø DMY_PL (kg/day)	18.2 ± 4.1	24.3 ± 15.6	20.2 ± 2.6	19.8 ± 2.6	19.7 ± 2.5	20.5 ± 2.5
Ø DMY_LT (kg/day)	11.0 ± 2.7	11.9 ± 2.2	12.3 ± 1.8	12.1 ± 2.0	12.3 ± 2.1	12.6 ± 2.1

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Complete questionnaire

Questionnaire productive lifespan of dairy cows

Thank you for your participation!

Name: _____ **Location:** _____

Date: _____

1. Farm manager

What is your year of birth? _____

How many years have you been running the farm? _____ years

What is you highest level of education? ☐ School graduation

Tick **ONE** applicable answer ☐ Agricultural apprenticeship

☐ Master

☐ University degree

Does your farm offer apprenticeships? ☐ Yes ☐ No

How many persons take care of the dairy herd? _____ persons

If you sum up the working hours (milking, feeding, barn and barn care, animal observation) of all the persons who take care of the dairy herd, how many working hours per day are spent on dairy cows in total? _____ hours/day

2. Sources of income

Is your farm a full-time or a part-time business? ☐ Full-time

Tick **ONE** applicable answer ☐ Part-time

For part-time farms: What percentage do you work on your farm? _____ percent

Is dairy cattle the main source of income for your farm? ☐ Yes ☐ No

How many branches does your farm have? _____ branches

Apart from dairy cattle, what other branches does your farm have?

Tick **ALL applicable** options

- ☐ Suckler cows
- ☐ Calf fattening
- ☐ Laying hens
- ☐ Fattening poultry
- ☐ Other poultry
- ☐ Piglet breeding
- ☐ Pig fattening
- ☐ Small ruminants
- ☐ Horse hosting
- ☐ Orchard
- ☐ Arable farming
- ☐ Vegetable gardening
- ☐ Tourism/Social
- ☐ Forest
- ☐ Direct marketing
- ☐ Others

How much kg milk delivery right (milk quantity) does your farm have?

_____ kg

According to which guideline or regulation do you currently produce?

Tick **ONE** applicable answer

- ☐ None
- ☐ ÖLN
- ☐ IP Suisse
- ☐ Organic Regulation
- ☐ Bio Suisse (including Demeter)

For how many years have you been producing according to these guidelines?

_____ years

3. Barn system and husbandry

Are the dairy cows horned?

Tick **ONE** applicable answer

- ☐ Yes
- ☐ Partly
- ☐ No

In what type of barn are the dairy cows kept?

Tick **ALL** applicable answers. If «Other», enter answer

- ☐ Tied barn
- ☐ Loose housing system with cubicles
- ☐ Deep litter barn
- ☐ Composted bedded packs
- ☐ Others: _____

Has there been any significant barn remodeling or new barn construction in the last 5 years?

- ☐ Yes
- ☐ No

Is the barn for dairy cows BTS compliant?

- ☐ Yes
- ☐ No

Is the grazing/ exercise for dairy cows in accordance with the Animal Welfare Regulation (TSchV), RAUS or beyond?

Tick **ONE** applicable answer

- ☐ TSchV
- ☐ RAUS
- ☐ beyound RAUS

What is the total area of the dairy barn (including lying area)? _____ m^2

What is the total area of the exercise yard for dairy cows? _____ m^2

Are there measures or facilities for additional cooling in summer?

If «yes», tick **ALL** applicable answers. If «Other», enter answer

- ☐ No
- ☐ Yes, nebulizer
- ☐ Yes, fan
- ☐ Yes, adjustable walls (curtains)
- ☐ Yes, others: _____

What material is the surface of the walkways made of?

Tick **ONE** applicable answer

- ☐ Concrete
- ☐ Rubber coating
- ☐ Mastic asphalt
- ☐ partly: _____ partly: _____

Is the walkway made of slatted flooring?

Tick **ONE** applicable answer

- ☐ Yes
- ☐ Partly
- ☐ No

In the case of cubicle stables: What kind of cubicles are installed in the lying area?

Tick **ONE** applicable answer

- ☐ Deep litter cubicles
- ☐ High boxes
- ☐ Both, deep litter and high boxes

In case of tied-barn: How are the cow pens designed?

Tick **ONE** applicable answer

- ☐ Short stand
- ☐ Medium-length
- ☐ Both, short and medium-length

What kind of lying mattresses is **mainly** present in the barn?

Tick **ONE** applicable answer. If «Other», enter answer

- ☐ Straw
- ☐ Rubber mat
- ☐ Lime-straw
- ☐ Sand
- ☐ Straw-manure
- ☐ Compost
- ☐ Comfort mattress
- ☐ Other: _____

How many cubicles or m^2 of unstructured lying area are available to the dairy cattle?

Tick **ALL** applicable answers.

_____ cubicles

_____ m^2 deep bedding area

Do dairy cows have permanent access to the exercise yard?

- ☐ Yes
- ☐ No

If there is no permanent access to the exercise yard: How many hours per day do the cows have access to the exercise yard? _____ hours/day

How many feeding places or how much feeding area in meters are generally filled with feed? _____ places _____ m

Can dairy cows be fixed at the feeding places? ☐ Yes ☐ No

4. Feeding

How many drinkers, subdivided by drinker type, are used in the barn?

If type of drinker is available, enter the appropriate number.

If "other», enter type of drinker.

_____ Trough drinkers

_____ Drinking bowl

_____ Other: _____

What kind of mineral feeding is applied?

Tick **ONE** applicable answer

☐ none

☐ only cattle salt

☐ cattle salt + minerals

Is propylene glycol regularly used prophylactically in fresh lactating cows? ☐ Yes ☐ No

What other supplementary feeds are used regularly? _____

Is there a separate group of dry cows?

Tick **ONE** applicable answer

☐ Yes, without preparatory feeding

☐ Yes, with preparatory feeding (transition period)

☐ No

Is there a group for fresh lactating cows? ☐ Yes ☐ No

The following questions refer to the estimation of the feeding components of your **dairy cows** in percent of the fed **fresh matter** (**optionally dry matter**). For this purpose, we distinguish between **summer feeding** and **winter feeding**. A transitional phase in spring and autumn is allocated to the winter feeding.

How many days do you practice **summer feeding** _____ days

What type of feeding is practiced in the barn during the summer feeding period?

Tick **ONE** applicable answer

☐ No barn feeding, full pasture

☐ Single components (incl. Fresh cut grass, no mixing truck)

☐ Partial mixed ration (e.g. TMR + extra hay)

☐ Total mixed ration (TMR)

What is the pasture management during summer feeding?

Tick **ALL** applicable answers.

☐ Continuous grazing

☐ Rotational grazing

☐ Strip grazing

The following percentages of feed components in summer refer to:

☐ Fresh matter

☐ Dry matter

What percentage of the forage during the summer feeding period comes from

… pasture? _____ percent

…fresh cut grass? _____ percent

…hay or hay from second cut («Emd»)? _____ percent

…maize silage? _____ percent

…grass silage? _____ percent

…concentrate feeding? _____ percent

...high energy concentrate? _____ percent

… high protein concentrate? _____ percent

All feed components should add up to 100%.

…other? _____ percent

If "other", description: _____

How many days do you practice **winter feeding, including transition periods**? _____ days

What type of barn feeding is practiced during the winter feeding and transition period?

Tick **ONE** applicable answer

☐ Single components (no mixing truck)

☐ Partial mixed ration (e.g. TMR + extra hay)

☐ Total mixed ration (TMR)

What pasture management is practiced during transitional feeding (spring and fall)?

Tick **ALL** that apply

☐ Continuous grazing

☐ Rotational grazing

☐ Strip grazing

The following percentages of winter and transitional feed components refer to:

☐ Fresh mass

☐ Dry matter

What percentage of the feed during winter feeding period **(including transition periods)** comes from...

... pasture? _____ Percent

...cut grass? _____ percent

...hay or straw? _____ percent

...corn silage? _____ percent

...grass silage? _____ percent

...concentrate feeding? _____ percent

...high energy concentrate? _____ percent

… high protein concentrate? _____ percent

All feed components should add up to 100%.

...other? _____ percent

If "other", description: _____

5. Milking and milking hygiene

How many times a day are the cows milked? _____ milking events

What type of milking equipment is used?

Check **ONE** applicable answer. If "Other", fill in the answer

- ☐ Bucket milking system at the stand
- ☐ Pipe milking system at the stand
- ☐ Herringbone milking parlour
- ☐ Tandem milking parlour
- ☐ Side-by-side milking parlour
- ☐ Milking robot (→ directly to "**All farms**")
- ☐ Other: _____

How many regular milkers are there on the farm? _____ milkers

How many milkers are there per milking event? _____ milker(s)/milking event

For farms with a milking parlour:

How often do more than a third of the cows have to be re-circulated to the milking parlour?

Tick **ONE** applicable answer

- ☐ At each milking
- ☐ Once a week
- ☐ Once a month
- ☐ Less than once a month

How many milking clusters do the dairy cows in your herd put down on average during a milking event? _____ milking clusters

How dirty is the milking parlour at the end of a milking event?

Tick **ONE** applicable answer

- ☐ Heavily soiled
- ☐ Clearly soiled
- ☐ Lightly soiled
- ☐ Not soiled

How many milking places are available? _____ milking places

All farms: How many milking aggregates do you have? _____ milking aggregates

Is fore-stripping the first thing done when milking? ☐ Yes ☐ No

What kind of teat cleaning takes place?

Tick **ONE** applicable answer

- ☐ No teat cleaning
- ☐ Dry teat cleaning
- ☐ Wet or moist teat cleaning (water/ cleaning solution)
- ☐ Disinfectant teat cleaning

If teats are cleaned: What type of cleaning material do you use to clean teats?

Check **ALL** that apply. If "Other", enter answer

- ☐ Paper towels (disposable)
- ☐ Cloth towels (reusable)
- ☐ Wood wool
- ☐ Other: _____

How many cows are cleaned with the same cleaning material (e.g. with the same paper/towel/wool)? _____ cows

How many cows are generally prepared at the same time?

Tick **ONE** applicable answer

- ☐ 1
- ☐ 2 to 4
- ☐ > 4

Is stimulation automatic? ☐ Yes ☐ No

Is the cluster automatically removed? ☐ Yes ☐ No

Are the teats disinfected after milking?

Tick **ONE** applicable answer

- ☐ Yes, by diving
- ☐ Yes, by spraying
- ☐ No, they are not disinfected

When dipping or spraying provide the product name: _____

Are cows milked in order of udder health? ☐ Yes ☐ No

Does an intermediate cleaning / intermediate disinfection of the aggregates take place during milking?

- ☐ No
- ☐ Yes, intermediate cleaning after problem cows
- ☐ Yes, intermediate cleaning after each cow
- ☐ Yes, intermediate disinfection after problem cows
- ☐ Yes, intermediate disinfection after each cow

If intermediate disinfection is practiced, provide, product name: _____

Is the system serviced more than once a year? ☐ Yes ☐ No

How is the system cleaned?

Tick **ONE** applicable answer

- ☐ Hot water
- ☐ Predominantly acidic
- ☐ Predominantly alkaline
- ☐ Acidic / alkaline alternating

6. Breeding objective and fertility aim

When are mating decisions **mainly** made?

Tick **ONE** applicable answer

- ☐ Periodically in advance (mating schedule)
- ☐ Shortly before mating
- ☐ Spontaneous during mating

What are the 3 most commonly selected breeding traits for your bull selection?

Tick a maximum of 3 correct answers. If necessary, breeding characteristics that are not in the list can be added.

- ☐ _____
- ☐ _____
- ☐ _____

Total/partial breeding values:

- ☐ Total breeding value (ISET)
- ☐ Production Index (MIW / IPL)
- ☐ Fitness Index (FIW / IFF)
- ☐ Pasture breeding value
- ☐ Genomically optimized breeding value

Production:

- ☐ Milk kg
- ☐ Fat kg
- ☐ Fat %
- ☐ Protein kg
- ☐ Protein %

Functional traits:

- ☐ Persistency
- ☐ non-return rate
- ☐ somatic cell count
- ☐ Fertility
- ☐ Productive lifespan
- ☐ Milking

Conformation traits:

- ☐ Overall score (ITP)
- ☐ Frame / Type
- ☐ Rump
- ☐ Feet and legs
- ☐ Udder
- ☐ Teats

Is there a bull running with the herd? ☐ Yes ☐ No

If a bull is running, for how many years? _____ years

If a bull **is running,** where did it come from?

Tick **ONE** applicable answer

- ☐ own breeding
- ☐ bought in
- ☐ rented

Are seasonal calvings (i.e. within 8 weeks) targeted? ☐ Yes ☐ No

If calving is seasonal, when is calving done?
Enter calving months From _____ to _____

Which waiting period is aimed at? _____ days

Is the insemination time adjusted to the milk yield of the cows? ☐ Yes ☐ No

If yes: At what maximum daily milk yield do you start inseminating the cows? _____ kg of milk

How many times per day are cows observed for heat detection? _____ times

Are aids used to detect oestrus? ☐ Yes ☐ No

If yes: Which aids are used?
Tick **ALL that** apply
- ☐ Manual color markings
- ☐ Pedometer
- ☐ Activity meter on the collar
- ☐ Other systems

Are hormone treatments used for fertility management?
Tick **ONE** applicable answer
- ☐ Yes, for problem cows
- ☐ Yes, for oestrus or ovulation synchronization.
- ☐ No

What criteria are decisive for the timing of the first insemination of **cattle**?
Tick **ALL that** apply and fill in the information.
- ☐ Age: at least _____months
- ☐ Weight: at least _____kg
- ☐ Seasonal, following months:

_____

7. Animal Health

How many sick boxes are there on the farm that are reserved exclusively for sick cows? _____ boxes

Do you use homeopathic remedies on your cows? ☐ Yes ☐ No

Do you use herbal home remedies on your cows? ☐ Yes ☐ No

Do you use other home remedies on your cows? ☐ Yes ☐ No

How many times per year does a **claw trimming** take place? _____ time(s) / year

Is **claw trimming** performed by a trained person?
Tick **ONE** applicable answer
- ☐ Yes, from external
- ☐ Yes, own training
- ☐ No

In addition, does a claw trimming take place regularly on each cow before drying off?

Tick **ONE** applicable answer

☐ Yes, always
☐ Partial
☐ No, never

Does a targeted prophylaxis of milk fever take place in cows from the third lactation onwards? ☐ Yes ☐ No

What percentage of calving takes place in a calving pen? _____ percent

Do you take part in a regular, at least 4-week, herd-medical-vet fertility management? ☐ Yes ☐ No

Are freshly calved cows systematically monitored during the first 14 days of lactation?

"special observation" is a daily assessment of appetite, rumen fill, udder condition, vaginal discharge, feces, checking metabolism, and measuring body temperature daily.

☐ Yes ☐ No

Is aprupt drying off practiced? ☐ Yes ☐ No

Are teat sealers generally used?

Tick **ONE** applicable answer

☐ Yes
☐ Partially
☐ No

How many cows have a triple udder currently? _____ cows

8. Breeding of replacement heifers **for the dairy herd**

Do rearing calves always receive at least **4 litres of** milked colostrum within **6 hours of** birth? ☐ Yes ☐ No

How long after birth does a rearing calf stay with its mother? _____ hours _____ day(s)

Do you raise the rearing calves yourself?

Tick **ONE** applicable answer

☐ Yes, all
☐ Partially
☐ No, none (delivery to rearing farm)

In the case of external rearing: When are the rearing calves delivered to the rearing farm?

Tick **ONE** applicable answer

☐ Before weaning
☐ Shortly after weaning (< 200 kg)
☐ As a feeder (≥ 200 kg)

What is fed to rearing calves during the drinking period?

Check **all that** apply

☐ Tank milk / milk of the dam
☐ Unmarketable milk
☐ Milk replacer

How long is the drinking period of the rearing calves? _____ weeks

How much milk is fed to a rearing calf during the drinking period? _____ litres

How much concentrate is fed to a rearing calf during the drinking period?

Tick **ONE** applicable answer

- ☐ No feeding with concentrated feed
- ☐ Restrictive feeding of concentrated feed
- ☐ Ad libitum feeding of concentrates

What kind of basic feed do rearing calves receive during the feeding period?

Tick **ALL that** apply

- ☐ Pasture
- ☐ Cut grass
- ☐ hay or emd ("Emd"= hay from second cut)
- ☐ Maize silage
- ☐ Grass silage

How are rearing calves kept during the drinking period?

Check **ALL that** apply. If "Other", enter answer

- ☐ Individual housing / Igloo
- ☐ Grouped
- ☐ Other: _____

Is the barn for rearing calves BTS compliant?

- ☐ Yes
- ☐ No

Is the grazing/exercise for rearing calves in accordance with the Animal Welfare Ordinance (TSchV), RAUS or beyond?

Tick **ONE** applicable answer

- ☐ TSchV
- ☐ RAUS
- ☐ Going beyond RAUS

In what type of barn are rearing calves kept **after they are weaned**?

Check **ONE** applicable answer. If "Other", fill in the answer

- ☐ Full-slat pens
- ☐ Cubicle barn
- ☐ Deep litter barn
- ☐ Bedded pack barn
- ☐ Sloped bedded barn
- ☐ Other: _____

In what type of barn are the **rearing cattle** kept from the age of **12 months**?

Check **ONE** applicable answer. If "Other", fill in the answer

- ☐ Full-slat pens
- ☐ Cubicle barn
- ☐ Deep litter barn
- ☐ Bedded pack barn
- ☐ Sloped bedded barn
- ☐ Other: _____

Is the barn for rearing cattle BTS compliant?

- ☐ Yes
- ☐ No

Is the grazing/exercise for rearing cattle in accordance with the Animal Protection Ordinance (TSchV), RAUS or beyond?

Tick **ONE** applicable answer

- ☐ TSchV
- ☐ RAUS
- ☐ going beyond RAUS

Do the rearing calves/cattle go to the mountain pasture? ☐ No

Tick **ONE** applicable answer ☐ Yes, one alpine summer

☐ Yes, two alpine summers

What percentage of the total feed (fresh matter) of a rearing cow (from weaning to first calving) comes from...

... pasture? _____ percent

...cut grass? _____ percent

...hay or straw? _____ percent

...straw? _____ percent

...maize silage? _____ percent

...grass silage? _____ percent

...concentrate? _____ percent

What is the goal of raising female offspring on your farm? _____ kg body weight at the age of ... _____ months

Fill in **ALL** applicable fields

Other destinations: _____

_____

9. Calf fattening

Are male and surplus female calves of the own farm fattened one the farm itsel? ☐ Yes ☐ No

If so:

What kind of milk is fed to the fattening calves?
Check **ALL that** apply.

- ☐ Milk replacer
- ☐ Tank milk
- ☐ Unmarketable milk

How many kg of dry matter (from whole milk and/ or replacer) are fed to a fattening calf on average over the entire fattening period? _____ kg

How many kg of basic feed are fed to a fattening calf on average over the entire fattening period? _____ kg

How much concentrate in kg is fed on average to a fattening calf over the entire fattening period? _____ kg

At what age are fattening calves slaughtered on average? _____ days

What is the average slaughter weight of fattening calves? _____ kg

Please turn to page. →

Finally, we would like you to write down a few sentences or keywords.

My personal thoughts on the subject of productive lifespan are:

The following aspects and topics should definitely be included when a strategy for increasing the productive lifespan is developed in the coming years:

From my point of view, the optimal productive lifespan for my farm would be: _____ lactations