MILK FEEDING PRACTICES FOR CALVES IN DIFFERENT EUROPEAN DAIRY CATTLE SYSTEMS

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CPH Cattle 2022

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MILK FEEDING OF DAIRY CALVES

EU Council Directive 2008/119/EC of 18 December 2008 laying down minimum standards for the protection of calves:

calves should be fed at least twice a day with an "appropriate diet adapted to their age, weight, and behavioural and physiological needs, to promote good health and welfare"

What does that imply?

Physiological needs:

- Calves are born monogastric -> delayed rumen development (4-8 weeks of age)
- Natural feeding pattern ->
  - 0-3 weeks 8-12 bouts (Reinhardt and Reinhardt, 1981)
  - 4 weeks up to 4 bouts per day (Das et al., 2000)
  - Weaning at 10 months of age (Reinhardt and Reinhardt, 1981)
- Recommendations state10-20 % of body weight (Khan et al., 2011, Costa et al., 2019)
- Calves 3-6 weeks of age can ingest 9-11 L/day (Jasper & Weary, 2002)

Behavioural needs:

- The taste of milk elicits the highly motivated sucking behaviour (Rushen & de Passillé, 1995)

SAME LEGISLATION – BIG STRUCTURAL DIFFERENCES ACROSS EUROPE

OBJECTIVE

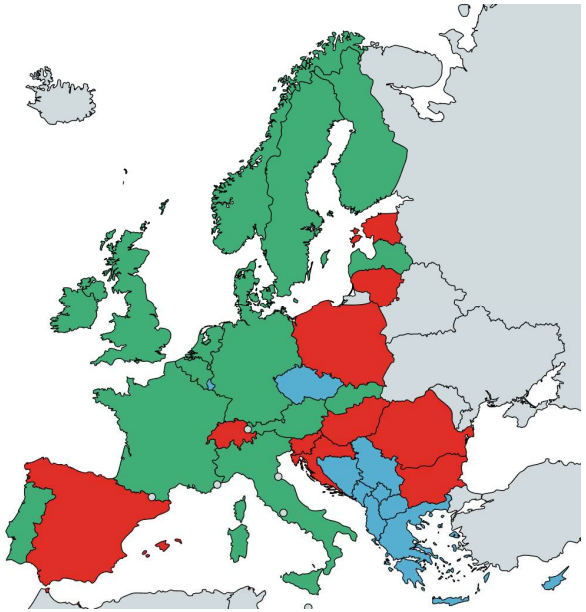
Overview of calf rearing practices across Europe from birth to weaning (first eight weeks of age)

Online questionnaire in SurveyExact

45 experts appointed from 25 countries

(advisors, veterinarians, researchers)

21 respondents from 15 countries



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SURVEY:

Five parts

Part I: Demographics, participants, dairy population and herds

Part II: The new-born calf & colostrum management

Part III: Young calves (1-4 week) management, milk feeding and housing

Part IV: Older calves (5-8 week) management, milk feeding and housing

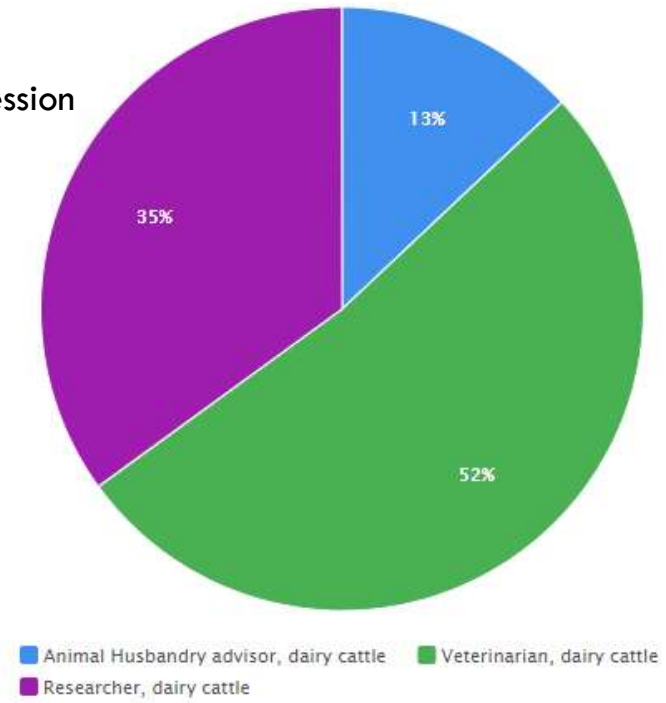
Part V: Weaning

Comments and remarks possible for each of the questions.

Participants were asked to provide answers for three production types: conventional, organic, and biodynamic production

DEMOGRAPHICS

Expert profession



Responses received for following countries:

Denmark (conventional, organic), Norway (West, East), Sweden, Finland, Latvia

Germany (North, East, South)

Belgium, The Netherlands

Ireland, The United Kingdom

Austria, Italy, Slovakia

France, Portugal (North, South, Azores)

DAIRY HERDS ACROSS EUROPE

Variations between countries and regions:

- Distribution of production type
  - 78-100 % conventional herds
  - 0- 22 % organic herds
- Herd size
  - 28-300 cows in conventional herds
  - 0-200 cows in organic herds
- Housing system
  - Loose-housing with cubicles

Country or region	Production type (%)		Herd size (N cows)		Most frequent system of housing of lactating cows	
	Conv	Org	Conv	Org	Conv	Org
Austria	78	22	33	.	Tie stall + pasture	Loose-housed, cubicles
Belgium	90	10	120	.	Loose-housed, cubicles	.
Denmark	85	15	253	130	Loose-housed, cubicles	Loose-housed, cubicles
Denmark	90	10	220	200	Loose-housed, cubicles	Loose-housed, cubicles
Finland	97	3	51	67	Loose-housed, cubicles	Loose-housed, cubicles
France	96	4	66	.	Loose-housed, cubicles	.
Germany, South	90	10	92	45	Loose-housed, cubicles	Loose-housed, cubicles
Germany, East	95	5	300	.	Pasture	.
Germany, North	.	.	.	.	Loose-housed, cubicles	Loose-housed, deep bedding
Ireland	95	5	84	.	Loose-housed + pasture	.
Italy	96	4	70	50	Loose-housed, cubicles	Tie stall + pasture
Latvia	90	10	50-300	50	Loose-housed, cubicles	Tie stall + pasture
Norway, West	95	5	29.3	29.3	Loose-housed, cubicles	Loose-housed, cubicles
Norway, East	97	3	28	32.1	Tie stall	Loose-housed, cubicles
Portugal, North	100	0	70	0	Loose-housed, cubicles	.
Portugal, South	90	10	500	200	Loose-housed, cubicles	Loose-housed, cubicles
Portugal, Azores	95	5	50	40	Pasture (all year)	Pasture (all year)
Slovakia	92	8	110	.	Tie stall + pasture	Loose-housed, deep bedding
Sweden	80	20	98	110	Loose-housed, cubicles	Loose-housed, cubicles
The Netherlands	97	3	100	100	Loose-housed, cubicles	Loose-housed, cubicles
United Kingdom	98	2	216	150	Loose-housed, cubicles	Loose-housed, cubicles

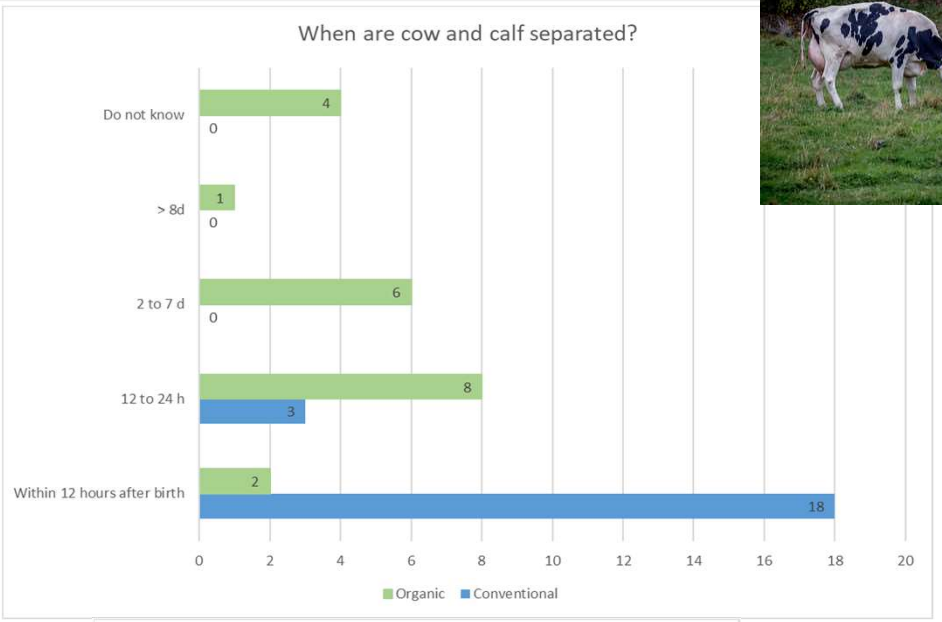
THE NEW-BORN CALF

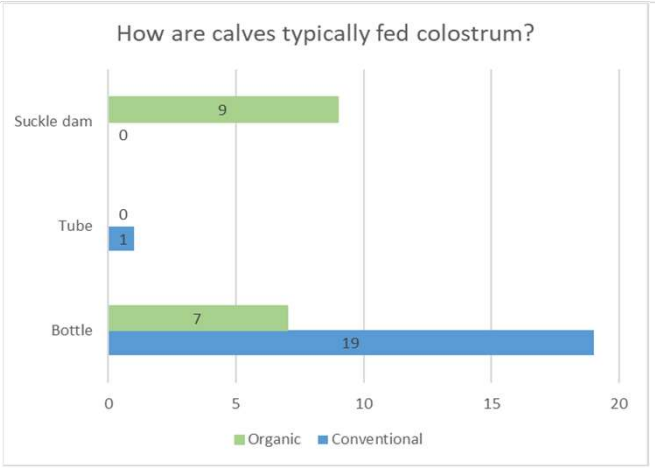
Bigger differences between production types than between countries (except NL and UK) for separation of calf and dam

Longer time before separation in organic herds and for in countries with general smaller herd sizes

Colostrum feeding method reflected time with dam

All respondents reported use of artificial teats (i.e. mounted dry or milk teats) for both systems





YOUNG CALVES (1-4 WEEK)

Daily milk feeding:

- **8-10 L/d** (9 %) in week 1 in conventional herds
- **8-10 L/d** (33 %) in week 1 in organic herds

- **2 feedings/day** of **6-8 L/day** in conventional & organic herds
- Tendency towards more daily feedings in organic herds: **3 or more feedings/day** Austria, Latvia, Norway, Portugal (South) and UK
- Tendency towards **higher milk allowance** in organic herds in early milk feeding
- Same levels by week 4 60 % vs. 66 % **>8 L/d**

Country	Week 1		Week 2		Week 3		Week 4	
	Conv	Org	Conv	Org	Conv	Org	Conv	Org
A	<6 L/day	6-8 L/day	<6 L/day	8-10 L/day	6-8 L/day	8-10 L/day	6-8 L/day	8-10 L/day
BE	6-8 L/day		6-8 L/day		6-8 L/day		8-10 L/day	
DK	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day
DK	<6 L/day	<6 L/day	<6 L/day	<6 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day
FIN	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day
F	<6 L/day	<6 L/day	<6 L/day	<6 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day
DE (South)	6-8 L/day	8-10 L/day	6-8 L/day	8-10 L/day	6-8 L/day	8-10 L/day	6-8 L/day	8-10 L/day
DE (East)	6-8 L/day		8-10 L/day		8-10 L/day		>10 L/day	
DE (North)	6-8 L/day		8-10 L/day		8-10 L/day		8-10 L/day	
IRL	<6 L/day		6-8 L/day		6-8 L/day		6-8 L/day	
IT	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day
LTV	6-8 L/day	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day	>10 L/day	8-10 L/day	>10 L/day
NO	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day
NO	6-8 L/day	8-10 L/day	6-8 L/day	8-10 L/day			<6 L/day	6-8 L/day
POR (North)	<6 L/day		6-8 L/day		8-10 L/day		6-8 L/day	
POR (South)	6-8 L/day	6-8 L/day	6-8 L/day	8-10 L/day	6-8 L/day	8-10 L/day	6-8 L/day	8-10 L/day
POR (Azores)	<6 L/day	<6 L/day	<6 L/day	<6 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day
SLO	6-8 L/day		8-10 L/day		8-10 L/day		8-10 L/day	
S	<6 L/day	<6 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day
NL	<6 L/day	<6 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day
UK	<6 L/day	<6 L/day	6-8 L/day	<6 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day

OLDER CALVES (5-8 WEEK)

Milk allowance

Country	Week 5		Week 6		Week 7		Week 8	
	Conv	Org	Conv	Org	Conv	Org	Conv	Org
A	6-8 L/day	8-10 L/day	<6 L/day	6-8 L/day	<6 L/day	6-8 L/day	<6 L/day	6-8 L/day
BE	8-10 L/day		8-10 L/day		8-10 L/day		8-10 L/day	
DK	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day
DK	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day
FIN	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day	8-10 L/day	<6 L/day	8-10 L/day
F	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day
DE (South)	6-8 L/day	8-10 L/day	6-8 L/day	8-10 L/day	<6 L/day	6-8 L/day	<6 L/day	<6 L/day
DE (East)	8-10 L/day		>10 L/day		8-10 L/day		8-10 L/day	
DE (North)	6-8 L/day		6-8 L/day		6-8 L/day		6-8 L/day	
IRL	6-8 L/day		6-8 L/day		6-8 L/day		<6 L/day	
IT	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day
LTV	8-10 L/day	>10 L/day	6-8 L/day	8-10 L/day	6-8 L/day	8-10 L/day	6-8 L/day	8-10 L/day
NO	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	<6 L/day	<6 L/day	<6 L/day	<6 L/day
NO	6-8 L/day		<6 L/day		<6 L/day		<6 L/day	
POR (North)	6-8 L/day		<6 L/day		<6 L/day		<6 L/day	
POR (South)	8-10 L/day	8-10 L/day	6-8 L/day	8-10 L/day	6-8 L/day	6-8 L/day	<6 L/day	6-8 L/day
POR (Azores)	8-10 L/day	8-10 L/day	6-8 L/day	6-8 L/day	<6 L/day	<6 L/day	<6 L/day	<6 L/day
SLO	8-10 L/day		8-10 L/day		8-10 L/day		8-10 L/day	
S	6-8 L/day	6-8 L/day	<6 L/day	6-8 L/day	<6 L/day	6-8 L/day	<6 L/day	<6 L/day
NL	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day	6-8 L/day
UK	6-8 L/day	6-8 L/day	<6 L/day	<6 L/day	<6 L/day	<6 L/day	<6 L/day	<6 L/day

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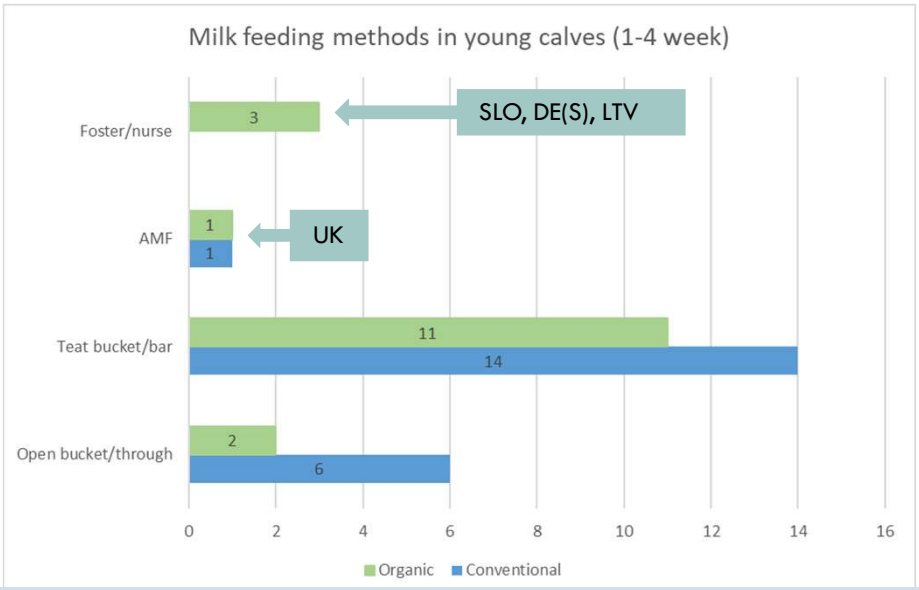
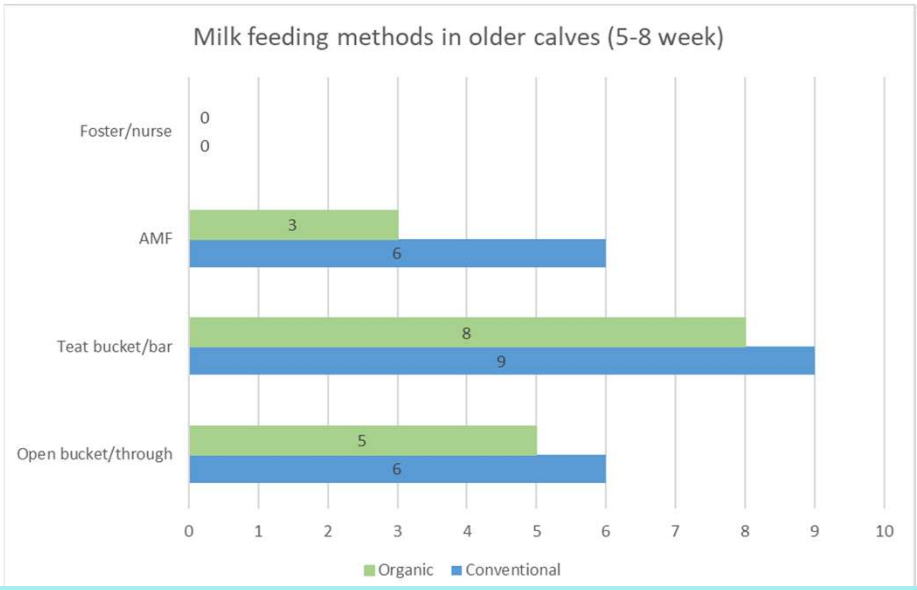
- Bigger differences **between countries** than production systems in regards to daily milk allowance
- **2 feedings/day** of **6-8 L/day** in conventional & organic herds
- Tendency towards **higher milk allowances** in organic herds
- Number of daily feedings decline towards week 8

MILK TYPE & FEEDING METHODS





Milk type week 1-4

Conventional herds:	whole & milk replacer 43 %, milk replacer 33 %, whole milk & waste milk 14 %
Organic herds:	whole milk 50 %, whole milk & milk replacer 25 %, whole milk & waste milk 25 %

Milk type week 5-8

Conventional herds:	milk replacer 62 %
Organic herds:	whole milk 50 %, whole milk & milk replacer 25 %, whole milk & waste milk 19 %

WEANING

- Weaning criteria:
  - **Age** (95 % of respondents)
- Weaning age:
  - **8-10 weeks** in conventional herds (57 % of respondents)
  - **> 10 weeks** in organic herds (73 % of respondents)
  - Earliest weaning age 6-8 weeks in conventional herds (Latvia, Norway & UK)
- Weaning method:
  - **Gradual weaning** over a 7 day period

- Once daily milk feeding:
  - 29 % of respondents reported the occurrence of one daily milk feeding in conventional herds and 21 % in organic herds
- Occurrence across countries/regions:
  - 5-80 % in conventional herds
  - 5- 25 % in organic herds
- Mean age at start:
  - 6 weeks (3-9 weeks) conventional herds
  - 7 weeks (4-10 weeks) organic herds

CHALLENGES

- **EU legislation:** not specific -> implementations in national legislation

- **Milk allowance:**
  - Energy requirements -> 10-20 % of BW milk fed daily -> at least 8 L of milk per day in week 3 (Johnsen et al., 2021; Jongman et al., 2020; Windeyer et al., 2014)
  - Welfare -> Hunger vs. positive emotional states
  - *Ad libitum* fed calves -> increased udder parenchyma (Browne et al., 2005)

- **Artificial teats:**
  - milk vs. dry teat -> mounted dry teats do not decrease abnormal oral behaviour (e.g. cross-sucking) (Reipurth et al., 2020)
  - position of teat -> in close proximity to milk buckets/troughs/teat or milk bar, 20 minutes post milk feeding
  - feeding by teat -> position of teat for young calves important for physiology (height 60-70 cm, nose below eye level) (Veissier et al., 2002)

CONCLUSIONS

- Larger variations between systems than countries in terms of:
  - Management of the new-born calf
  - Milk allowance
  - Once daily milk feeding
- Discrepancies between recommendations and most common practices found:
  - Milk allowance
  - Once daily milk feeding
- Perspectives:
  - More research needed
  - Milk feeding methods
  - Use of milk and dry teats

QUESTIONS?