



Research Institute for
Farm Animal Biology



Adequate milk feeding of dairy calves

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Session 4: Research on Young Stock Care:
The Journey of the Calves from Gestation Onwards

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EAAP
European Federation
of Animal Science

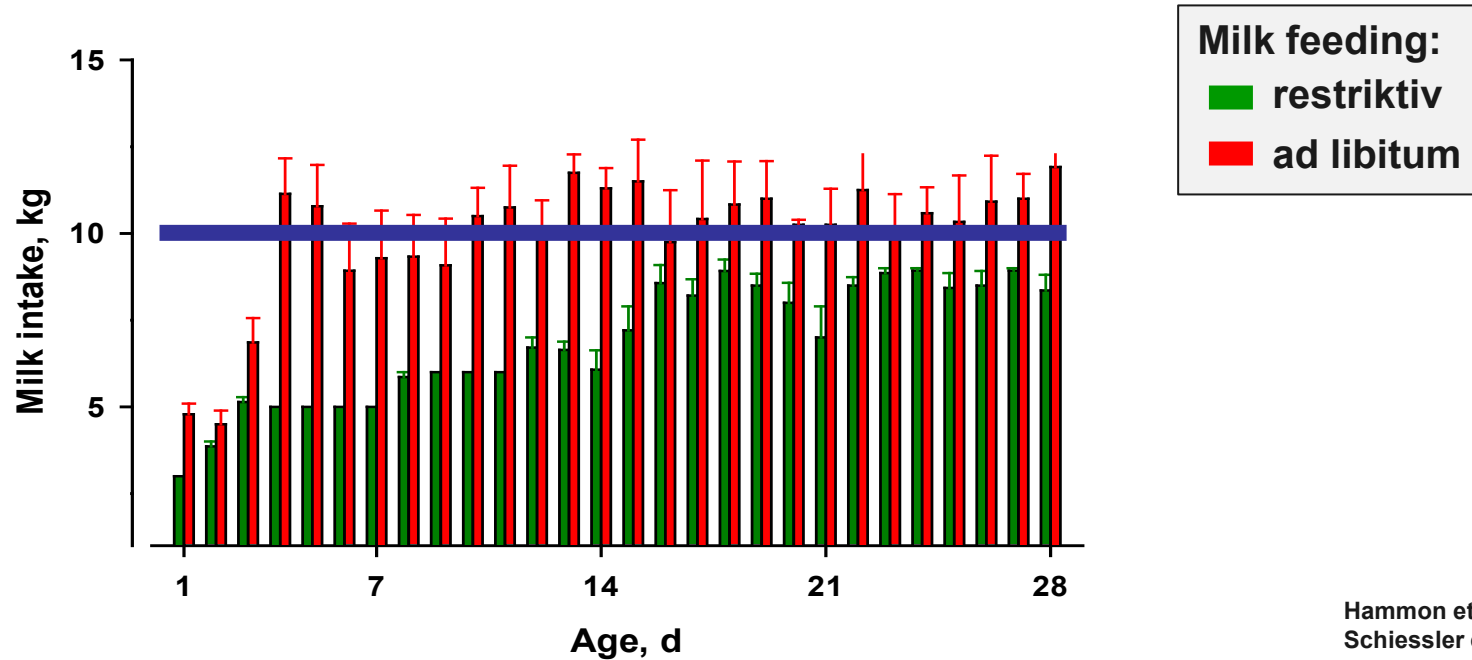


Milk feeding management during the pre-weaning period



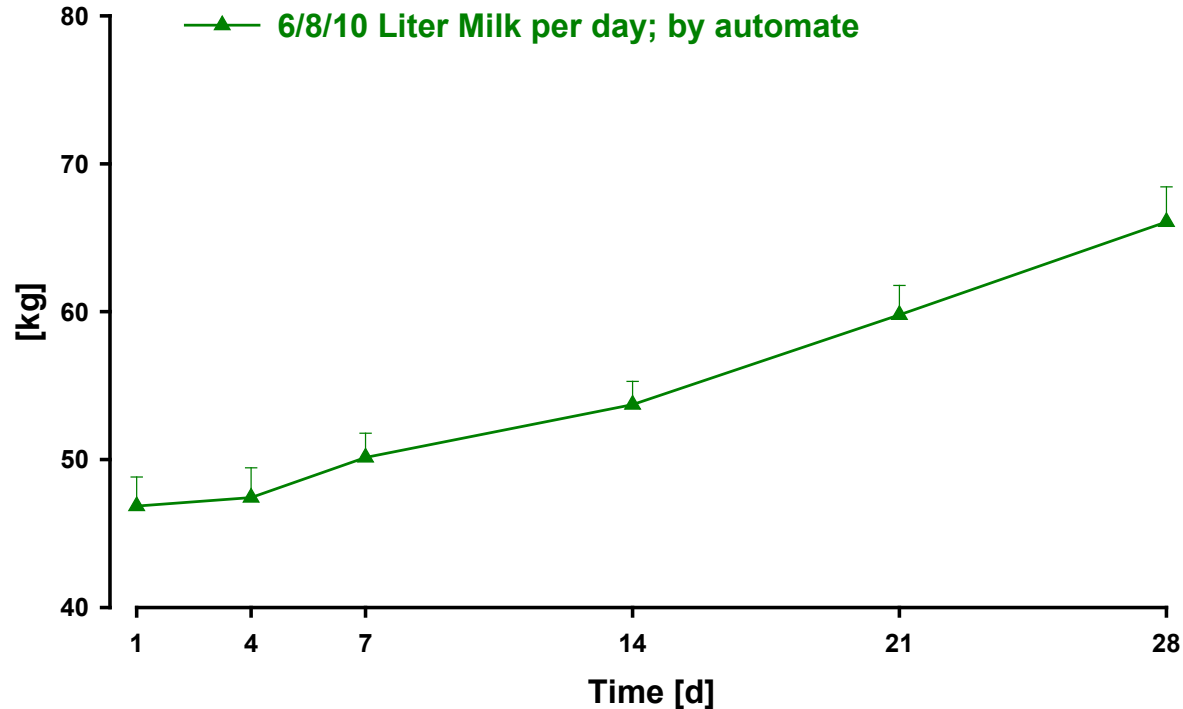
- **Common rearing strategies in milk-fed calves aim to stimulate rumen development and function through low milk feeding and forcing calves to eat solid feed as early as possible after birth.**
- **Potential for growth and development in calves is much greater than realised in common feeding schedules with a low milk intake;
Suckling calves receive much more milk and have much greater postnatal growth rates than breeding calves.**
- **Concerns for a higher milk feeding level in dairy calves:**
 - ➔ **Ad libitum milk feeding is costly**
 - ➔ **Ad libitum milk feeding reduces solid feed intake**
 - ➔ **Rumen development is retarded**

Comparing ad libitum versus restrictive milk feeding



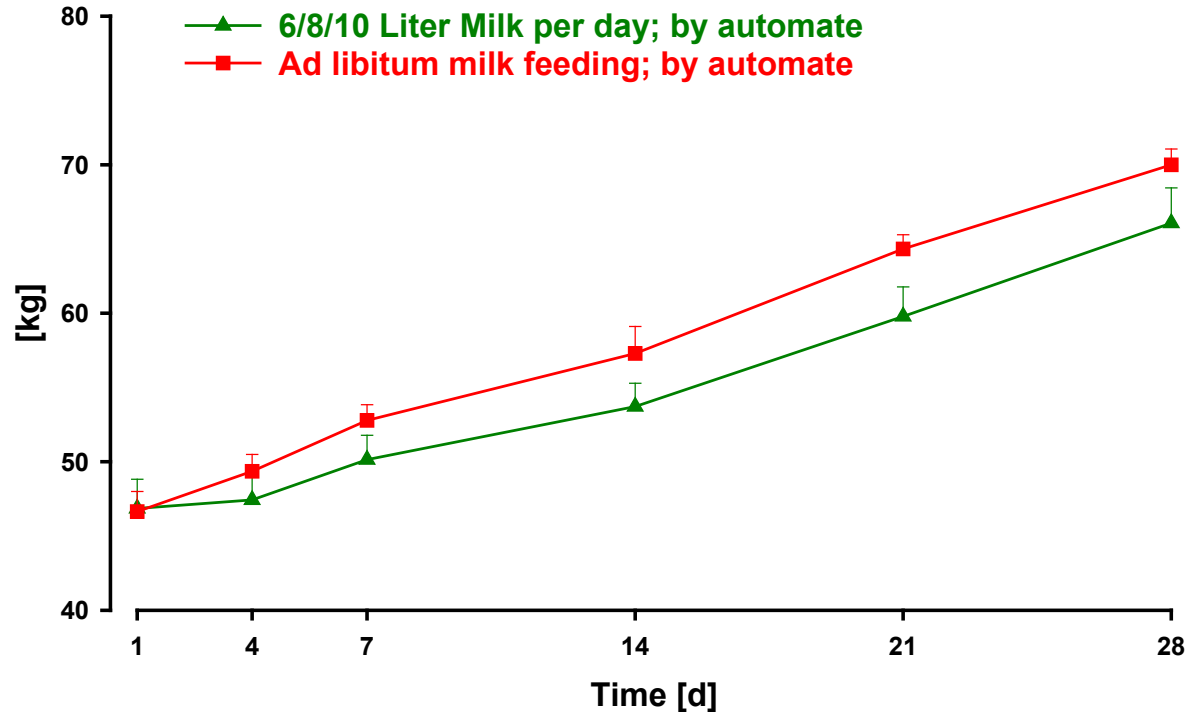
Hammon et al., 2002
Schiesler et al., 2002

Milk feeding during first month of life: Body weight with different milk feeding regimes



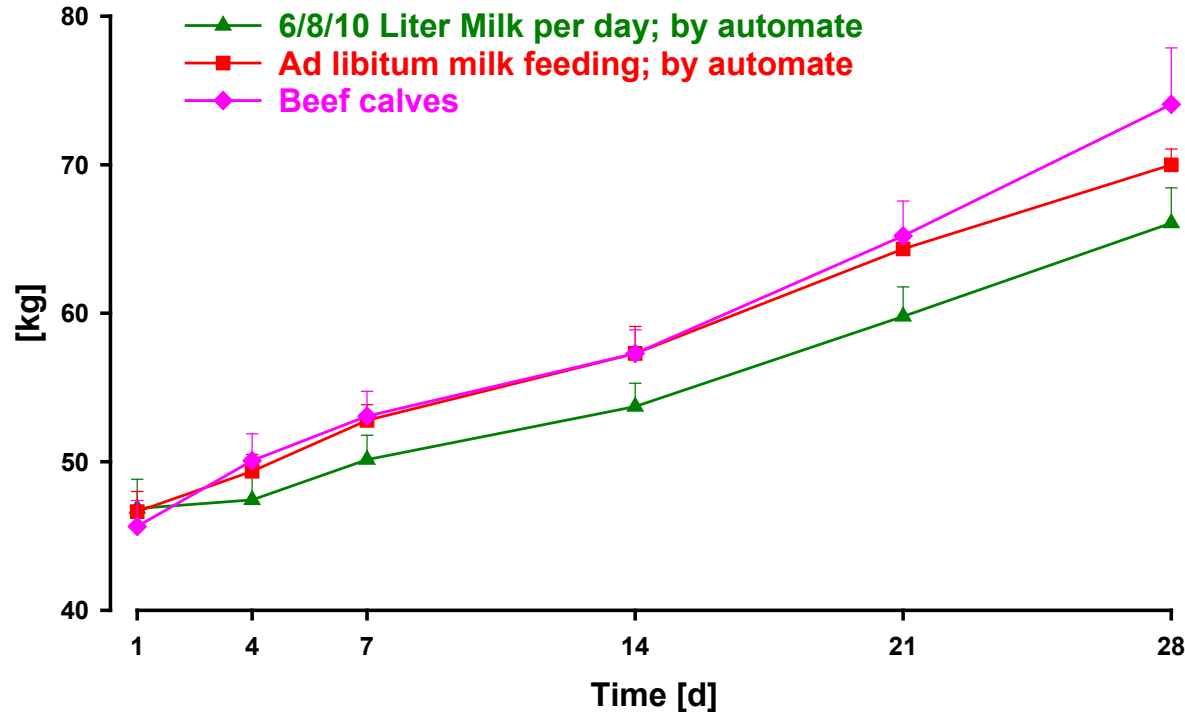
Hammon et al., 2002

Milk feeding during first month of life: Body weight with different milk feeding regimes



Hammon et al., 2002

Milk feeding during first month of life: Body weight with different milk feeding regimes



Hammon et al., 2002
Schuessler et al., 2002

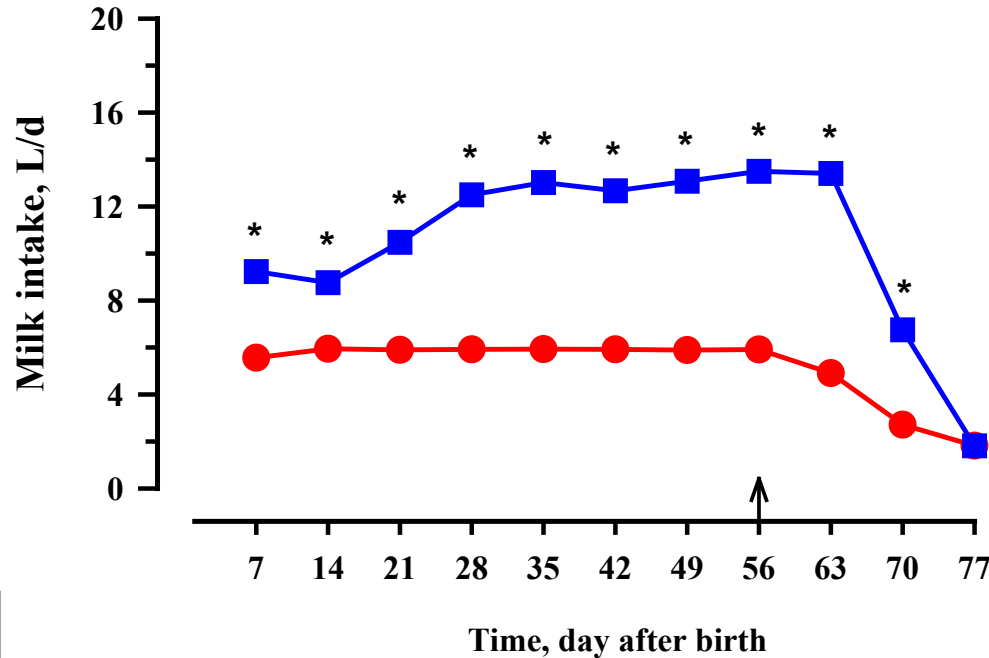
Ad libitum versus restrictive milk feeding for 8 weeks

Milk intake:

■ High

● Low

Milk intake



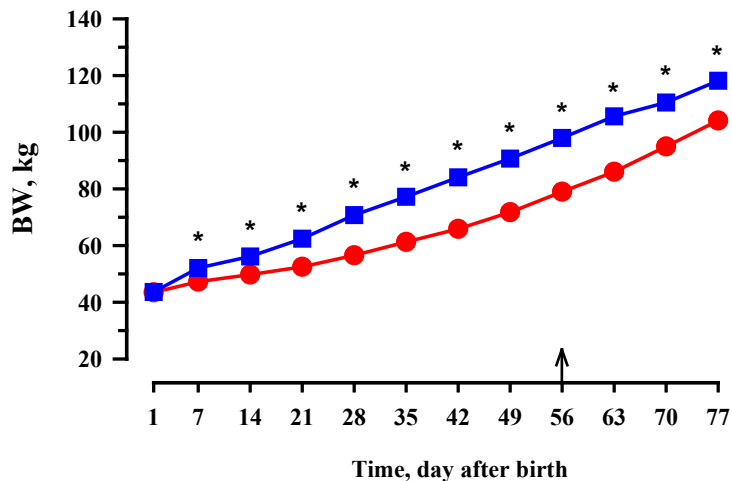
Ad libitum milk feeding: Performance

Milk intake:

■ High

● Low

Body weight



↑ Step down

* P < 0.05



Body weight: **63** kg versus **83** kg
in week 7 of age

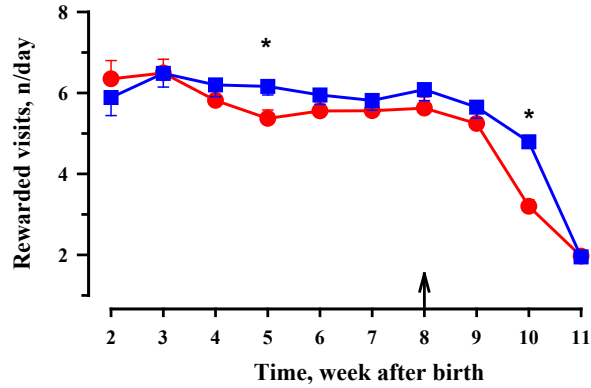
↑ Step down
* $P < 0.05$

Ad libitum milk feeding: Feeding behaviour

Milk intake:

■ High
● Low

Rewarded visits



Hunger

The Farm Animal Welfare Committee (FAWC)¹, UK, 1979:



Five Freedoms for farm animals

Freedom from hunger, thirst and discomfort.
Freedom from pain, injury and disease.
Freedom from poor nutrition and health.
Freedom from fear and distress.
Freedom from boredom, loneliness and other behavioural needs.

Freedom from discomfort.

Freedom from pain.

Freedom to express normal behaviour.

Freedom from fear and distress.

¹Since 01-10-2013



Opinion on the welfare implications of nutritional management strategies for artificially-reared calves from birth to weaning

February 2015

Farm Animal Welfare Committee
Area 6B, Nobel House
17 Smith Square
London SW1P 3JR, UK

www.gov.uk/government/groups/farm-animal-welfare-committee-fawc

maintain health and

and treatment.

proper facilities and

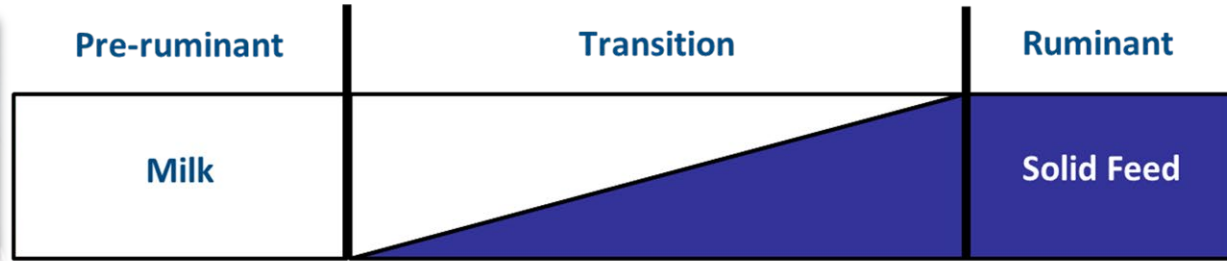
which avoid mental

High milk feeding level and calf health



- **Feeding management during the preweaning period has a great impact on the success of calf rearing and health in later life**
(Khan et al., 2011; Ballou, 2012; Van Amburgh and Soberon, 2013)
- **An enhanced milk feeding during preweaning**
 - ➔ **indicates a faster recovery from diarrhoea caused by infection with *Cryptosporidium parvum*** (Ollivett et al., 2012)
 - ➔ **shows greater resistance against *Salmonella typhimurium* in postweaning calves** (Ballou et al., 2015)
 - ➔ **causes less calf losses and less severe immune response after a combined viral-bacterial respiratory challenge postweaning** (Sharon et al., 2019)
 - ➔ **plays a key role in the prevention of neonatal calf diarrhea** (Lorenz et al., 2021)

The weaning process as a challenge

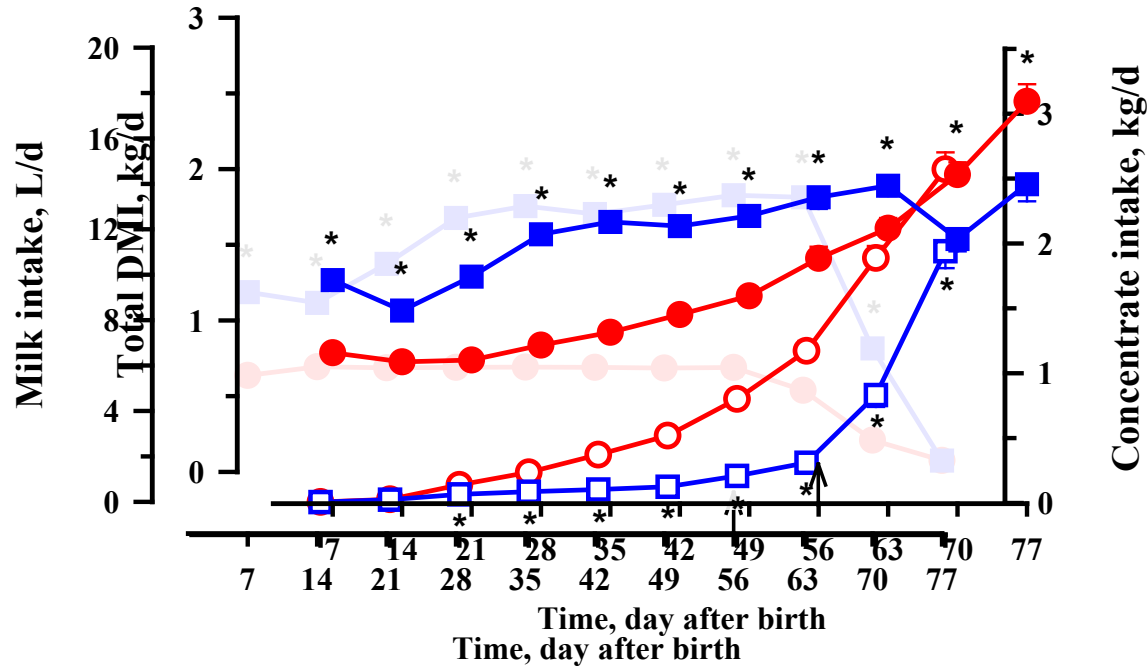


Ad libitum milk feeding: Milk and concentrate intake

Milk intake:

- High
- Low

Milk intake Total dry matter intake Concentrate intake



↑ Step down

* P < 0.05

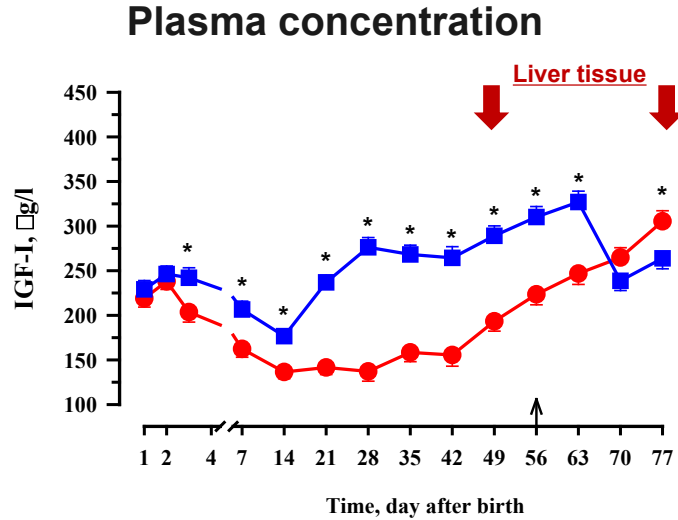
Ad libitum milk feeding and the somatotrophic axis:

Insulin-like Growth Factor (IGF-I)

Milk intake:

■ High

● Low



↑ Step down
* $P < 0.05$

Rumen fluid: Volatile fatty acids and pH after weaning (80 d of age)

VFA mmol/l	Milk Replacer		SE	P-Value
	Ad lib	Restrictive		
Acetic acid	78.2	69.9	4.1	0.2
Propionic acid	50.5	51.6	3.8	0.8
Butyric acid	18.0	14.3	1.6	0.12
Total VFA	155.9	144.0	8.9	0.4
pH	5.9	6.2	0.2	0.3

Koch et al., 2019



Imperative necessity of adequate colostrum and milk feeding

- High level of colostrum and transition milk feeding guarantees adequate immunoglobulin supply and stimulates postnatal growth and immune response
- High level of milk intake
 - further supports postnatal growth and development by stimulating the somatotrophic axis
 - avoids hunger and promotes the well-being of the calves
 - does not impair rumen development and function but requires more time for the weaning process
- ➔ Ad libitum milk feeding is a pre-requisite for animal health and well-being
- ➔ Ad libitum milk feeding will avoid the intensive use of antibiotic treatments
- ➔ Ad libitum milk feeding will result in resilient and robust dairy cows and bulls

CODABE = COnnecting **DA**iry **BE**ef network

CODABE is about

➤ **Network**

More about CODABE in Session 18:

Sustainable and smart integration of the dairy and beef sectors in EU

➡➡➡ this afternoon in this room you are now

aiming a more **sustainable** and **socially accepted** dairy beef
production system



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15 – 18 September 2025
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<https://isep2025-fbn.de/>

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