

Can a concentrate diet enriched by natural vitamin E keep the vitamin E level high in calves after weaning?

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Introduction I

- A plasma vitamin E concentration in weaned calves:

- ✓ Lower than 0.5 mg/L is **lethal**

- ✓ Lower than 1.5 mg/L shows **deficiency**

- ✓ Higher than 3.0 mg/L is considered a sufficient level **to improve the immune function**

- **Low vitamin E** concentration in plasma (about 1 mg/mL) **after weaning** shows deficiency signs in calves due to:

- **Low** content of natural isomer (**RRR- α -tocopherol**) in the concentrate

- **physiological stress** due to changing diets, or moving calves between animal groups

- **Low absorption** efficiency of the acetate form of all-rac- α -tocopherol

Introduction II

- ✓ Calves may be exposed to a **higher infection** pressure **during weaning and transition phase** in rosé veal calf production due to **vitamin E deficiency**
- ✓ We hypothesize that by supplementing **high levels of natural vitamin E** in the solid feed during the **weaning-transition phase**, it is possible to keep the plasma vitamin E level high during this critical period post-weaning

The aim was to investigate the effect of **a vitamin E supplement in the calf starter concentrate** on plasma vitamin E level and growth rate

Material and methods

- The experiment was conducted at **three Danish commercial farms** producing rosé veal calves
- Total of **307 unweaned calves** at 3-4 weeks of age and approximately 60 kg LW
- The standard pelleted concentrate was fed **unsupplemented (CON)** or **supplemented with 488 ± 24 mg RRR- α -tocopherol (TRT)/kg diet**
 - The **TRT** feeding consisted of 90% standard pelleted concentrate and 10% pelleted vitamin E supplement
- The ME content of **TRT** was only 95% of the ME content of **CON**

Material and methods

- Three different vitamin E supplements (one per farm) were made all with the **same vitamin E type and concentration**, and all prepared as pellets.

The only difference between the three vitamin E supplements was if they were without minerals, with inorganic minerals or contained organic minerals

- **Plasma vitamin E** was analyzed by **HPLC** at start, at weaning, and 2 to 3 weeks after weaning
- **LW** was recorded **at the beginning, at weaning and at the 2 to 3 weeks after weaning**

Statistics

- Statistical analysis for **performance data were analyzed for each farm** separately

$$Y_{ijk} = \mu + E_i + P_{(F)ij} + \varepsilon_{ijk}$$

E was the fixed effect of vitamin E supplement ($i = 1, 2$), **P** the random effect of pens nested within treatment, and ε_{ijk} were the random residual errors, assumed to be independent.

- Statistical analysis for **plasma vitamin E across the farms**

$$Y_{ijk} = \mu + E_i + P_{(F)ij} + \varepsilon_{ijk}$$

E was the fixed effect of vitamin E supplement ($i = 1, 2$), **P** the random effect of pens within farms nested in farms, and ε_{ijk} were the random residual errors

Results

Growth performance of calves receiving diets with (TRT) or without (CON) vitamin E supplement in #2 farm as an example (LSMeans \pm SEM).

	CON	TRT	p-value
Initial live weight (kg)	288 \pm 10	288 \pm 10	0.69
Weight gain (kg)	199 \pm 10	199 \pm 10	0.99
ADG (g/d)	765 \pm 30	765 \pm 30	0.86
ADG, from weaning (g/d)	827 \pm 31	765 \pm 30	0.04
ADG, start to end (g/d)	827 \pm 31	765 \pm 30	0.17

Similarly, no significant difference was observed for growth performance on the other two farms:
The slightly lower ADG can be explained by dust and lower ME of TRT vs CON

Unsupplemented (CON) or supplemented with RRR- α -tocopherol (RRR- α -T)

Results

Plasma vitamin E content (mg/L) of calves receiving diets with or without vitamin E supplement in three rosé veal calf farms (Lsmeans \pm standard error of means)

	Pre-weaning	Weaning	Post-weaning
CON	2.1 \pm 0.4	3.4 \pm 0.6	1.3 \pm 0.3
TRT (RRR- α -T)	2.4 \pm 0.4	5.1 \pm 0.6	3.7 \pm 0.3
p-value	0.66	0.04	<0.001

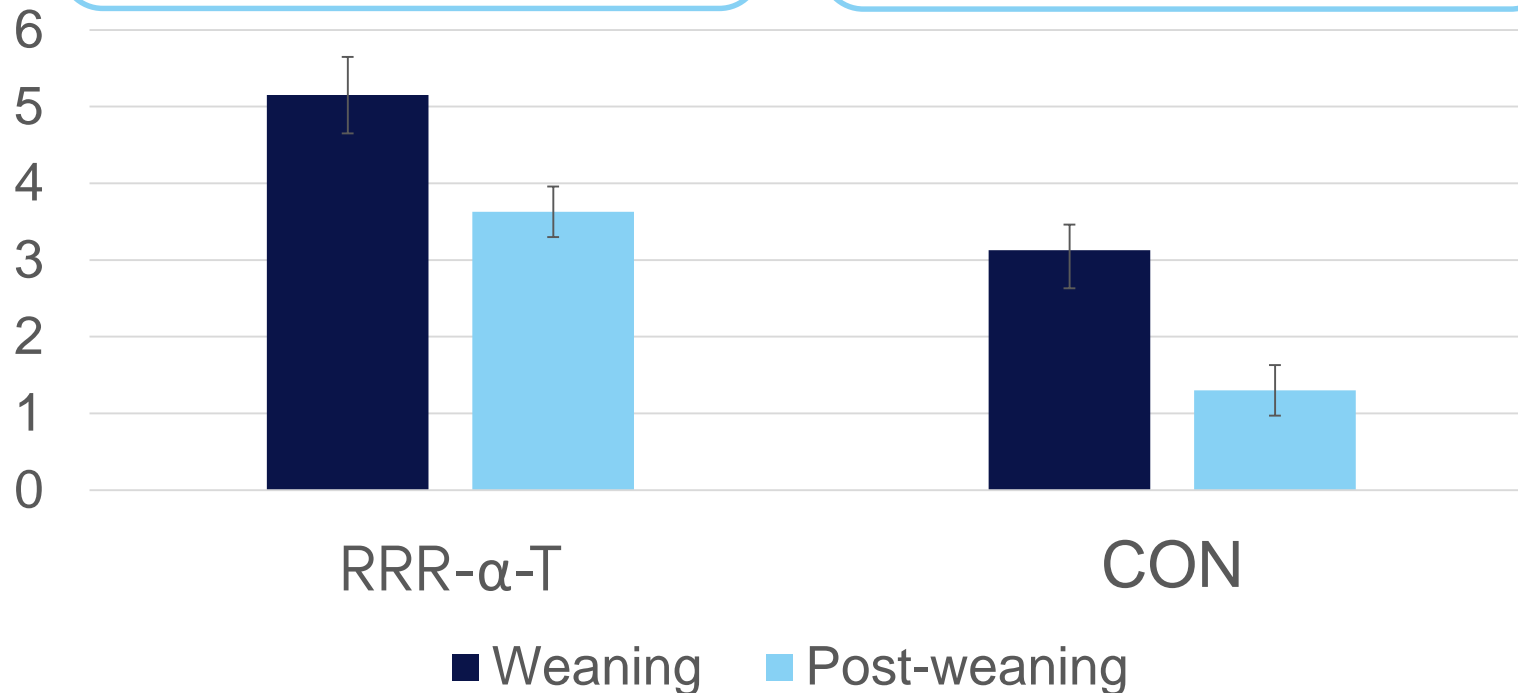
Unsupplemented (CON) or supplemented with RRR- α -tocopherol (RRR- α -T)

Results

Plasma vitamin E content (mg/L) of calves receiving diets with or without vitamin E supplement across the three farms

Time effect, $p < 0.001$
Covariate, $p = 0.59^*$

Time effect, $p < 0.001$
Covariate, $p = 0.002^*$



➤ Unsupplemented (CON) or supplemented with RRR- α -tocopherol (RRR- α -T)

➤ Pre-weaning vitamin E content included as covariate

Conclusion

- ✓ Vitamin E supplementation with a high amount of **natural vitamin E** on the alcohol form increased the **plasma vitamin E level** well above the recommended level to keep an optimum immune function of calves in the first weeks after weaning

Next steps

- ✓ **Considerable attention** has to be paid to the critical role of vitamin E around and after weaning in calves
- ✓ The **optimal dose to be used in calf starter** concentrates needs validation

Thank you for the attention



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