



Project Title: RELACS: Replacement of Contentious Inputs in organic farming Systems

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Table of Contents

1. Executive summary.....	4
2. Dissemination activities related with the Deliverable.....	5



1. Executive summary

Vitamin E is essential, and supplementation on top of the native tocopherol contents in feed components is often needed to meet the animal's requirement. This is particularly relevant during long indoor periods where conserved forages must be fed, as conservation may destroy tocopherol. Tocopherol, however, is only available in synthetic forms and synthetic vitamins are regarded as contentious inputs in organic agriculture. Therefore, the aim of the current work was to evaluate if the standard recommendations for supplementation can be revised for organically managed dairy cows. This is because the recommended supplementation may be overestimated, especially in forage-based feeding systems where grazing or grass-clover silages are the basal feed with low to moderate concentrate levels in the diet (<40% of the DM intake).

A systematic literature review was conducted to analyse the response to vitamin E supplementation and assess the response to supplementation considering animal life stage and the composition of the basal diet. Altogether 91 eligible references were found, and most of the experiments that focused on animal health related issues (33 out of 40) were conducted during critical phase in the dairy cow's production cycle, i.e. the transition period, late gestation and early lactation. In experiments which the vitamin E recommendations systems are based on, and in more recent studies which report positive effects of vitamin supplementation on animal health and fertility, cows were fed conserved forages as hay, haylage or maize silage, which all have low natural content of vitamin E. In studies reporting no or only minor positive effect of vitamin E supplementation, cows were fed diet based on grass or grass-clover silages. Few studies report any effect of extra vitamin E supplementation on animal health during lactation. Most of the studies conducted during lactation had their focus on milk oxidative stability and milk fat depression related to diets supplemented with fat rich in polyunsaturated fatty acids, diets that are of less relevance in organic production.

Based on the literature review, surveys of vitamin E status on organic dairy farms, experiments with vitamin E supplementation conducted within organic dairy farming systems, and the diet of major organic dairy farming types in Europe, a proposal for recommendation for dairy cows in organic dairy production is made. It is suggested that for dairy cows that are more than 30 days in lactation, where grazing pasture or grass clover silage is the main forage, no extra vitamin E supplementation is required. Other feeding systems (NRC 2001 and INRA 2018) recommend that lactating dairy cows should be supplemented with about 10-30 international units (IU) vitamin E per kg total dry matter intake (DMI), where the lowest value is for cows on pasture. For lactating organic dairy cows that are fed diets with hay, haylage, whole crop silage or maize silage as the main forage, it is recommended that they are supplemented with 15 IU/kg DMI, about 50% lower than other feeding systems. Due to huge variation in the concentration of α -tocopherol in conserved forages and to avoid compromising animal health and welfare, organic dairy cows during the transition period, about 1 month before and after parturition, should be supplemented with 25 IU/kg DMI. This is the same as recommended by INRA (2018). For grazing organically managed cows and heifers during the transition period, the supplementation can be reduced by about 50% relative to organic cows on conserved forages.



2. Dissemination activities related with the Deliverable

A manuscript for scientific peer-reviewed publication was written by 30.04.2021. It will be submitted to a livestock journal in due time, and, once published (gold open access), linked to this deliverable.