

General conclusions

In conclusion, different trials in poultry, swine and ruminants showed that Grape PP improves the oxidative status of animals and meat. It improves the immune status of the animals and the shelf life of meat. Research indicated enhanced technical results: Grape PP gives comparable results at a significant lower cost. A combination of anti-oxidants has been shown to be more effective than one anti-oxidant used at a high level. Figure 6 summarizes the main characteristics and benefits of the combination of Grape PP and vitamin E.

Figure 6. Main characteristics and benefits of Grape PP and vitamin E



Grape PP Concentrate

Immunity is influenced by the relation between oxidants and anti-oxidants in the animal. The animal experiences oxidative stress when there are too many oxidants or too few anti-oxidants. To enhance immunity by improving the anti-oxidative status of animals, Provimi has introduced Grape PP concentrate.

Grape PP contains flavonoids (Figure 1) with a high level of procyanidines. Inclusion of Grape PP leads to broad-spectrum antioxidant protection. The flavonoids have a uniquely high bio-availability due to the right extraction process. After thorough research, Grape PP appeared to be a much stronger anti-oxidant than vitamin E and vitamin C.

Figure 1. Flavonoids

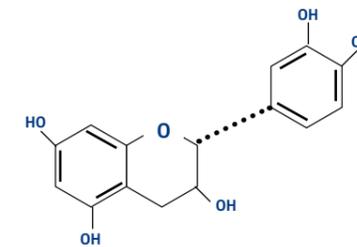
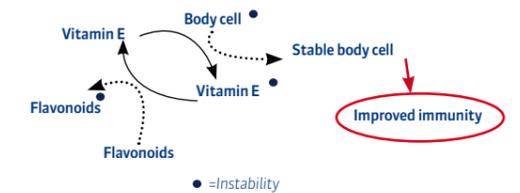


Figure 2. Grape PP supports the effect of vitamin E



In addition, Grape PP improves the functionality of vitamin E (Figure 2). After a body cell has become unstable due to oxidants acting upon it, vitamin E re-stabilizes the cell. In this process, vitamin E itself becomes unstable. Flavonoids then stabilize vitamin E, making it available again as an antioxidant. This way, flavonoids improve the functionality of vitamin E, allowing a replacement of up to 50% of the supplemented vitamin E. The replacement factor of vitamin E by Grape PP in poultry and swine diets is indicated in Table 1. The recommendation for dairy cows is given in Table 2.



Block G, Hilton Quarry Office Park,
400 Old Howick Road, Hilton, KwaZulu-Natal
T +27 (0)87 806 4000 F +27 (0)86 719 7941
E info@provimi.co.za | www.provimi.co.za

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”Improve **anti-oxidant** complex and save money”



Table 1. Replacement of vitamin E by Grape PP in poultry and swine diets

Vitamin E level in diet	Replacement of vitamin E by Grape PP
< 10 IU/kg	0%
10 – 40 IU/kg	25%
> 40 IU/kg	50%

Table 2. Replacement of Vitamin E by Grape PP in dairy cow diets

Minimum Vitamin E level	Replacement of by Grape PP
Dry Period 1000 IU/day	50% of additional Vitamin E
Lactation 500 IU/day	

Example

A piglet feed contains 100 IU vitamin E. According to the table 50% can be replaced. These 50 IU corresponds with 100 g vitamin E50. Thus, 100 g Grape PP concentrate needs to be included.

The replacement of vitamin E by Grape PP is well tested in research institutes. These results are confirmed by commercial farm experience. Besides increasing the anti-oxidant activity, replacement results in cost savings, especially at high levels of vitamin E.

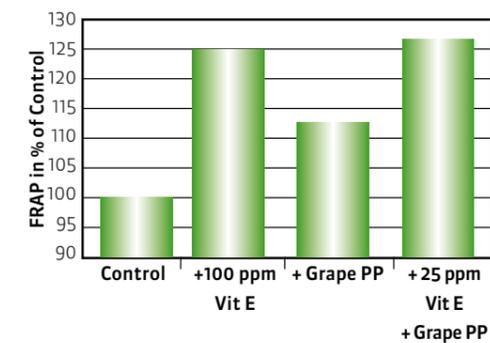
Grape PP and Poultry

The anti-oxidant effect of Grape PP has a positive effect on the oxidative resistance in body tissue, and therewith on the shelf life of meat. To test the effect of Grape PP on oxidative resistance shelf life of meat, a trial was performed at the research farm of Provimi “De Viersprong” with four treatments:

- 1) Negative control
- 2) Positive control with 100 ppm vitamin E
- 3) Grape PP
- 4) 25 ppm vitamin E + Grape PP

Figure 3 shows the FRAP (Ferric Reducing Antioxidant Power) of the different treatments as measurement of oxidative resistance. High levels (100 IU) of vitamin E clearly improve the oxidative resistance. When only Grape PP is used, the oxidative resistance is in between the negative control and the treatment with high vitamin E. When a combination is used of low vitamin E (25 IU) and Grape PP, the oxidative resistance is at the same level as the treatment with high vitamin E, but the costs are considerably lower. These results show that a combination of a base level of vitamin E in combination with Grape PP is the most economical way to create optimal oxidative resistance in the birds.

Figure 3. Effect antioxidants on FRAP (oxidative resistance) in body tissue



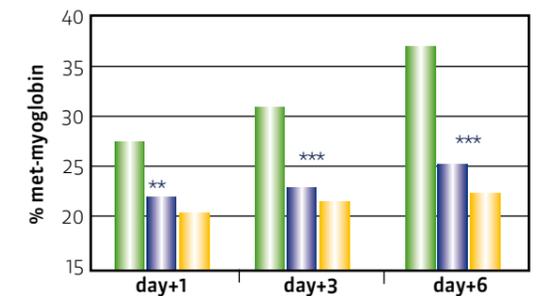
Grape PP and Swine

The shelf life of meat is improved by anti-oxidants. To test the effect of Grape PP on the shelf life of meat, a trial in finisher pigs was performed with three treatments:

- 1) Negative control with 15 ppm vitamin E
- 2) Positive control with 200 ppm vitamin E
- 3) 100 vitamin E + Grape PP (92 ppm vit. E eq.)

The levels of met-myoglobin were measured at 1, 3 and 6 days after slaughter. These levels are an indicator of the oxidation status, with high levels being detrimental. Figure 4 shows that the high level of vitamin E improved shelf life of meat in comparison with the low level of vitamin E. The Grape PP group had a tendency to improve meat quality compared to the high level vitamin E treatment. Additionally feed costs were significantly lower for the Grape PP group compared with the high vitamin E group.

Figure 4. Level of oxidation in pig meat



Significant: ** = p<0.01; *** = p<0.001

Grape PP and Ruminants

Ruminants experience oxidative stress, particularly in the transition phase. The effect of this oxidative stress is reduced productivity. Figure 5 shows the effect of different plant extracts on the anti-oxidative status in blood of ruminants. Grape PP was by far the most effective antioxidant. Through its beneficial anti-oxidant properties the Grape PP will improve the immunity of the animal. Extensive use of Grape PP concentrate in the Rupromin minerals and buckets confirm these results.

Figure 5. The effect of plant extracts on the total antioxidant status

