As feed additives, rare earths were shown to improve body weight gain and feed conversion in nearly all categories of farming animals (chickens, pigs, ducks, cattle). Additionally, improvements in milk production in dairy cows, in egg production in laying hens and in output and survival rate of fish and egg hatching of shrimps were noticed. Feed additives used thereby predominantly contain light rare earths (La, Ce, Pr, Nd) but even though both organic (nitrates, chlorides etc.) and inorganic (ascorbates, citrates etc.) rare earth feed additives are commercially available, organic ones are claimed to provide better results.

Based on the effects reported in Chinese studies, experiments were initiated under Western conditions in order to investigate the action of rare earths on both plant and animal growth. Several Western feeding trials conducted on animals have been able to demonstrate significant performance enhancing effects after dietary rare earth application, while results obtained from experiments on rare earths on plant growth have been controversial. In pigs, improvements in body weight gain of up to 19 % and in feed conversion rate of 10 % were observed after their diets were supplemented with low-dosed rare earth chlorides. Even better effects were however noticed after rare earth citrates were added to the feed of pigs. Furthermore, under field conditions, rare earths were shown to increase body weight gain by up to 10 % and improve feed conversion by up to 9 % in pigs. Following these results, rare earth containing feed additives in terms of Lancer® have entered the market in Switzerland, where a temporary permission has been granted for their use in pig production.

In addition, in broilers, rare earths were also shown to increase final weights by 7 % and improve feed conversion by up to 3 %. Very recent studies also confirmed performance enhancing effects in broilers with increased body weight gain and feed intake of up to 6.6 % and 6.9 %, respectively. In rats, which were used as a small animal model, improvements in body weight gain and feed conversion of 4 - 7 % and 3 - 11 %, respectively, followed the application of rare earths. Thus, clear performance enhancing effects were achieved in Western studies on rats, pigs and poultry due to dietary rare earth supplementation. However, there are also studies in which positive effects of rare earths on animal performance were not as obvious or not observed at all.

A comparison between the results of these feeding experiments as to the mixture of rare earths, the concentration as well as the compound applied showed that these parameters are involved in the magnitude of performance enhancing effects of rare earths. At present, no definitive statement on optimum composition can be made. However, a dose-dependency was observed in several trials and better effects have been achieved when the mixture of rare earths was applied instead of single lanthanum. Additionally, it seems that organic rare earth compounds have a higher impact on animal performance than inorganic ones. This is probable ascribable to different chemical characteristics, which lead to variations in both absorption and bioavailability.

Generally, absorption of orally applied rare earths is very low, with more than 95 % being recovered in the feces of animals. According to minute gastrointestinal absorption of rare earths, oral toxicity is very low and comparable to usual table salt. LD50 values determined in various animal experiments range from 830 mg/kg to 10 g/kg body weight. None of the feeding trials performed any effects on the state of health of the animals, which coincides with low oral toxicity and additionally supports the safe application of rare earth feed additives to animals. In addition, no effects on either meat or carcass quality were observed. Likewise, rare earth concentrations determined in organ samples were very low.
Animal husbandry is a branch of agriculture concerned with the care and management of livestock. Animal husbandry deals with the feeding, breeding, housing and health care of livestock for getting maximum benefits. Livestock refers to farm animals (domesticated animals) such as cow, sheep, etc. kept by humans for a useful commercial purpose. When we use the word “Animal” in animal husbandry, we mean only those domesticated animals which are reared mostly for economic or for recreation purposes, such as cattle, buffalo, sheep, goat, camel, pig, horse, etc. It also includes poultry farming and fish. Rare earth elements (REE) are identified by the International Union of Pure and Applied Chemistry and these elements, 15 belong to the group of lanthanides with atomic numbers 57–71. They are extracted or via a previous alkaline fusion of the materials to be analyzed. The state of rare earth elements in different environmental matrices has been studied extensively. However, the role of rare earth elements in agriculture, particularly in animal husbandry, is not well understood.

Although the mechanism underlying performance-enhancing effects of rare earths is not completely understood, several proposals have been made. According to current research, rare earths might exert their action locally within the gastrointestinal tract, including effects on the bacterial microflora as well as on nutrient uptake, digestibility and utilization. Likewise, anti-inflammatory and anti-oxidative effects may also contribute to positive effects. Additionally, actions on the intermediate metabolism in terms of effects on cellular functions, growth and digestibility-related hormones and enzymes or the immune system have also been considered. It might also be possible that rare earths are not yet identified as essential elements.

Based on the information gained in this study, it has been concluded that rare earths are of high interest as possibly new, safe, inexpensive feed additive in Europe, especially in pig and poultry production.