

The 2001 edition of NRC's 'Nutrient Requirements of Dairy Cattle' made a significant change in the method used to formulate rations for mineral content. The new requirements are now calculated as 'absorbable mineral'. The term absorbable means *the proportion or percentage of the mineral in a particular feed stuff that is available to the animal for absorption*. Rations will now have to be formulated to provide the required amount of absorbable mineral. This sounds like a task that can easily be accomplished with computer programs. However most ration balancing programs are not designed to do this. The computer program that comes with the NRC Requirement tables will do the necessary calculations, however it is far too cumbersome to be used for routine ration formulation.

Rations balanced to meet the new recommendations will look different than the ones we are used to. The table provides a comparison between the 1989 NRC and the 2001 edition of NRC. The example rations were balanced for selected minerals to meet the requirements of a 680 kg cow, 90 DIM producing 25 kg or 45 kg of milk. The values in the table are the total amount of each mineral in the diet dry matter.

Milk kg	25	25	25	45	45	45
NRC edition	1989	2001	% chg	1989	2001	% chg
Calcium %	0.51	0.62	+21	0.64	0.67	+5
Phosphorus %	0.33	0.32	-3	0.41	0.36	-12
Magnesium %	0.20	0.18	-10	0.25	0.20	-20
Copper ppm	10	11	+10	10	11	+10
Manganese ppm	40	14	-65	40	13	-67
Selenium ppm	0.3	0.3	0	0.3	0.3	0
Zinc ppm	40	43	+7	40	52	+30

In general, the calcium content of dairy diets will increase 5 to 20% above previous recommendations. This change is due mostly to a decrease in the estimated absorbable calcium content of forages from 38% in NRC 1989 to 30% in NRC 2001. Of potentially greater interest to us, because of the concern over excess phosphorus excretion into the environment, is the apparent drop in phosphorus requirements of the cow. This drop in phosphorus

NRC 2001 Mineral Requirements

content of dairy diets is due entirely to an increase in the estimated availability of phosphorus in forage and concentrates. In NRC 1989, 50% of dietary phosphorus was thought to be

available for absorption – this has now increased to 64% for forage and 70% for concentrates. Most dairy rations contain much higher levels of phosphorus than those shown in the table. Extra phosphorus is often added to lactating cow rations in the belief that it promotes optimal reproduction. NRC 2001 states: "...there is no evidence to support feeding dietary phosphorus in excess of requirements to improve reproductive performance of dairy cattle".

Changes to trace mineral requirements have also been recommended. In past editions of Nutrient Requirements of Dairy Cattle, trace mineral requirements have been reported as a concentration in the diet. The NRC 2001 states requirements in milligrams per cow per day. The cow producing 25 kg of milk as shown in the table requires 223 milligrams of copper daily. At 90 DIM a ration containing 11 ppm of copper would provide the required amount of copper. However, the same cow at 10 DIM would be consuming considerably less feed but still requires

223 mg of copper and the ration would need to contain about 16 ppm. The same example would apply to the other trace elements. There is no change in selenium requirements and we should not see changes in premixes, supplements or complete rations as a result. Modest adjustments in copper and zinc levels are likely. Larger changes in manganese supplementation should be expected.

In practical terms, these changes to mineral requirements will mean that dairy producers will see mineral content in rations that will look quite a bit different than in the past. Nutritionists will have to revise premix, supplement and mineral formulations. All involved in dairy nutrition will have to evaluate the recommendations on phosphorus requirements especially as it concerns reproduction.

source: Rick Corbett, Dairy Research and Technology Centre