

AGRICULTURAL PRODUCTS REQUIREMENT (APR) MODEL DESCRIPTION

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Introduction

Rapid transformation to this new scenario is required in order to remain competitive, and strategies have to be adjusted accordingly. The only accurate method of predicting raw material requirements for South Africa is to determine the number of animals that need to be nourished, the nutrient requirements of those animals as well as feed consumption to meet those requirements at specific time periods during their life cycle.

The transformation of South Africa from a controlled to a free market environment has resulted in global price trends having a significant effect on decision-making in local agriculture.

A model has been developed which takes into account the demand for animal products and determines the animals that need to be nourished, the nutrient requirement of those animals and the feed consumption to meet the requirements for specific time periods and performance criteria. This model takes into consideration the prices of all available raw materials on a local and international scale, the most cost effective use of raw materials can be determined by linear programming (formulation). Local raw material availability constraints will further determine volumes of imported material required.

The model is the first available to the industry that can determine the requirements for animal feeds and animal feed raw materials currently and for the future based on linear programming considering nutrient requirements of animals and the nutrient contribution from raw materials. The model is known as the Agricultural Products Requirement Model (APR).

The effect of numerous parameters on raw material requirements can be rapidly calculated by making use of the Agricultural Products Requirements (APR) model. These parameters include population growth, animal product imports and exports, animal performance, raw material prices and raw material availability.

The movement between types of raw materials to fulfil requirements can be determined with a change in numerous other parameters. These parameters are; raw material prices and components of raw material prices, animal distribution, raw material distribution and raw material availability.

The APR Model integrates information about demand for animal products, animal performance, raw material availability and raw material price. The program calculates the amount and type of raw materials required to meet various scenarios of product demand.

The model caters for various scenarios, which can be considered for the particular model and year in question. Scenarios can be created based on consumed quantities of animal products which allows for the calculation of animal feed and raw materials derived from the quantity of animal products consumed in South Africa. Scenarios can also be based on produced quantities of animal products that allows for calculations derived from the number of animals slaughtered or nourished in the case of animals not for consumption.

The model is supplied with default information in all areas of the model so as to allow logical

functioning of the model at time of set-up. The default numbers can be overridden. The user should verify the validity of the data that is changed specifically with reference to units that have been used. Detailed instructions on how to use the APR model are shown in Appendix 3.

The APR model can be divided into two main sections:

1. Calculations of animal feed demand from per capita consumption of animal products making use of animal performance data (Figure 1.1).
2. Linear programming considering the animal feed demand, raw material availability and prices to determine raw material requirements (Figure 1.2).

Regional demarcation was based on the inability to obtain accurate data on animal distribution in South Africa at provincial level as well as the impossible task of keeping this data updated. Often large animal producing companies may have operations straddling the borders of provinces. No official data exists for animal production per province. Data was obtained for three regions and the country divided into Inland, Cape and Natal, this data was obtained from industry representational organisations and considered the most accurate way to describe animal production per province. Markets for animal products are not necessarily in the province of production and are more likely to be transported to the market where they are required.

Feed production capacity has not been considered as a limiting factor to supply demand for animal feed as utilisation in the industry is currently only 85%. It is also reasonable to accept that if milling capacity is saturated additional capacity will be created. The assumption is made that feed will be supplied from the same area in which the animal production is taking place. This is verified by the fact that an average industry delivery distance is currently only 200km round trip.

Demand for feed is a derived demand generated by the livestock industry as well as the animals kept for non-consumption purposes such as horses and pets. Countries from which macro raw materials could possibly be imported have been used in the model namely, Argentina, Brazil, USA, Chile and Peru.

Raw materials that are available after having considered factors such as the need for human consumption will be used by the animal feed industry to produce least cost animal feeds based on the nutrient contribution of the raw materials and their price. Least cost linear programming is commonly used by the feed industry.

FIGURE 1.1

Representation of the model interrelationships for determining feed demand

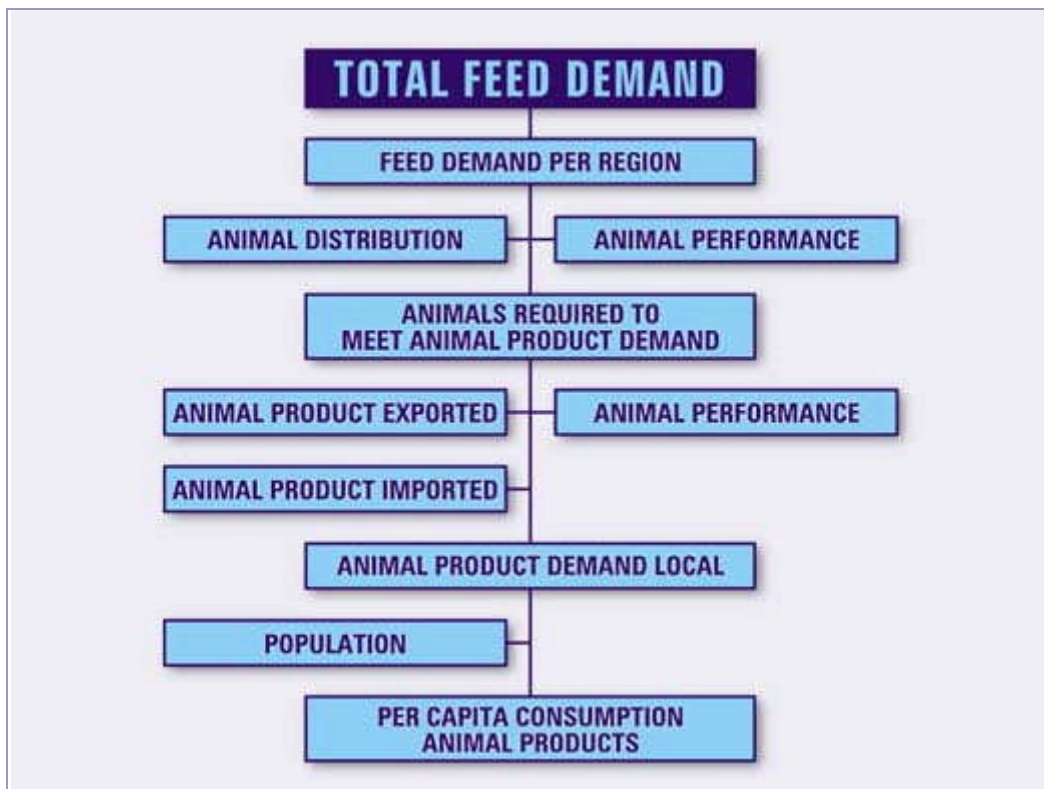
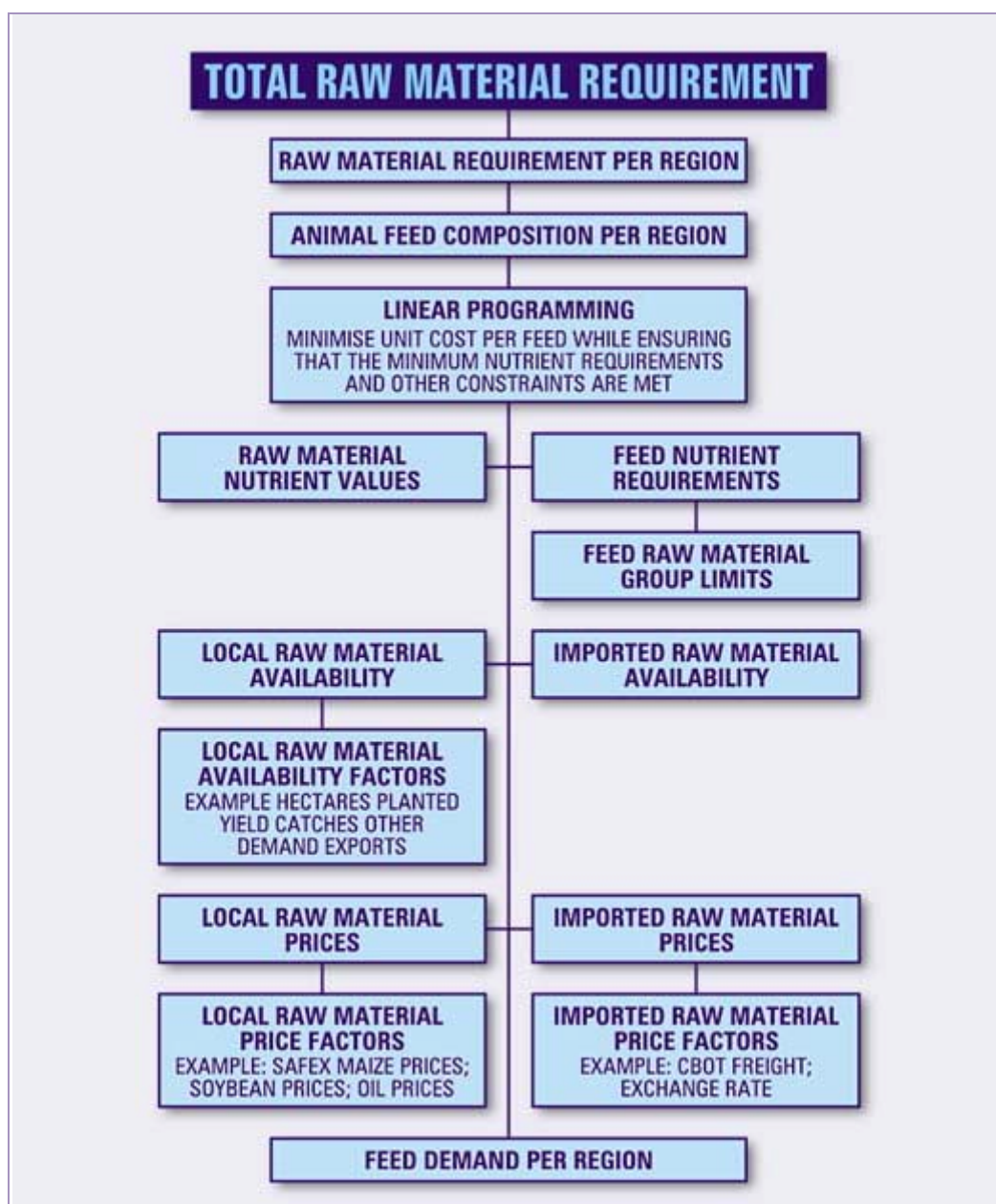


FIGURE 1.2

Representation of the model interrelationships for determining raw material demand



Livestock

Category

In order to determine the demand for raw materials, all categories of animal types that consume feed need to be considered (Figure 1.3).

Each main category is divided into sub-categories and in some cases sub-sub categories. Consumption patterns as well as nutrient requirements are determined for each livestock category and are broken down into numerous sub-categories to accurately predict their raw material requirements.

FIGURE 1.3

Categories of livestock to be considered in the APR model

ANIMAL TYPE

