Creating New Opportunities for Inter-Institution Communication, Collaboration and Competition in the Classroom

Ration Evaluation and Formulation software (REAFS) is a new type of teaching tool for the Feeds and Feeding/Animal Nutrition classroom. REAFS is a series of software products, each designed with the same controls (function keys and buttons), for 14 different types of economically important livestock, poultry, fish and pets. By virtue of the on-line feed library, REAFS creates new opportunities for communication, collaboration and competition. The contact information of sponsoring companies becomes part of the on-line feed library so that REAFS can be offered to educators and their students at no cost.

Introduction

Instructors that have used ration evaluation and formulation software in the classroom have usually had to rely on products used in the feed industry. Unlike REAFS, industry software products are not designed with an educational focus. In addition, a broad-based course will likely cover more animal types than served by a single industry software product. If instructors want to use software in instruction of all animal types studied, they will need to use multiple software products, reducing the efficiency of instruction. With REAFS, there is no learning curve for software operation. When switching from the study of dairy cow nutrition to broiler nutrition, students can immediately work with rations and focus on the nutritional differences.

Pages in the Workbooks

Each of the fourteen REAFS products are constructed as 25-28-page Microsoft Excel workbooks that are operated using buttons and function keys which have been assigned to macros. The Mac operating system (Apple) is not capable of running REAFS' macros.

REAFS contains a separate page for each life phase of the animal that is associated with unique nutritional requirements. Each animal page contains a Home display, an Input Animal display and a Make Ration display. Users may create their own links on the home page of REAFS. The Home display also contains a link to the REAFS Facebook page which houses images of animals, digestive tracts and feedstuffs. Users may also publish their farm information on REAFS' Facebook page.

Prior to 2016, REAFS products were distributed with a Feed Table containing the name, cost and analysis of one hundred feedstuffs. At the start of 2016, a feed library with infinite capacity was created on the Feed Records page of RationFormulation.com. REAFS now accesses this feed library and users of REAFS choose which feedstuffs from the on-line list to include on their Feed Table. Users of REAFS may add feedstuff information directly to their Feed Table or they may have them added to the on-line feed library. The latter option makes them available to all users of REAFS, worldwide.

The Whole Farm page of REAFS accesses all the animal pages to make whole farm calculations such as profitability, farm efficiency, animal and feedstuff inventories, feedstuff run-out dates and manure production.

Other pages in REAFS include charts that display the nutrient status of a developing ration in graphic form. REAFS contains pages that graph price trends over time. Another chart compares current feed price to its value based on the current energy and protein cost in corn and soybean meal. The Feed Table page contains feedstuff and feed blend information including name, nutrient analysis and cost per ton.

Mobile Companion

A mobile companion for each of the fourteen REAFS is available. The mobile companion may be used on a smart phone or tablet that contains an appropriate spreadsheet application. The phone then replaces paper worksheets and calculators. The phone can be used to collect and store data in the barn, at the ranch, on the pasture or at the kennel to record information about the animal, its environment and management. The information entered on the phone may be imported into REAFS by clicking on the Import button.

Methods

Instructional videos for REAFS are available at RationFormulation.com. Also, a stand-alone program designed to run concurrently with REAFS is available. The small window floating over the REAFS display replaces worksheets as it walks users through the steps of ration evaluation and formulation.

All REAFS products are operated using the following buttons which display on the Home page: Switch Groups, Input Animal, Select Feedstuffs, Make Ration, Blend Feedstuffs, View Blends, Print. Following is a description of each of these buttons.

Switch Groups button

The Switch Groups button allows users to switch to a new page in REAFS.

Input Animal button

The Input Animal button is where users enter information about the animal, its environment and management. This information is used to predict dry matter intake, energy and nutrient requirements using information from the most current National Research Council publication for each animal type.

Select Feedstuffs button

Clicking on the Select Feedstuffs button sends the user to the Feed Table. Users select feedstuffs from the on-line feed library for inclusion in their Feed Table. Finding feedstuffs from the on-line list is facilitated by sort buttons. Users may sort the list alphabetically if they know the name of the feedstuff they want or by nutrient if they are looking for a powerful source of a particular nutrient.

Conceptually, the on-line feed library represents all existing feedstuffs. The Feed Table represents the feedstuffs inventoried by the local feed mill. Users select feedstuffs from the Feed Table for use in each developing ration. Ration feedstuffs are inventoried where the animals are fed (on the farm/ranch/kennel).

The on-line feed library provides more to the REAFS user than feedstuff choices. A notification appears on the Feed Table when price updates are available from the on-line feed

library and users may update the prices of the feedstuffs on their Feed Table by clicking the Update Prices button. Another notification appears on the Feed Table when new feedstuffs have been added to the on-line feed library. Sponsor information is downloaded from the on-line feed library and placed on the Feed Table.

On the Feed Table page, feedstuff energy values are calculated using inputted digestibility of organic components and the user may replace inputted energy values with the calculated values by clicking on the Replace Energies button.

Make Ration button

After making selections from the Feed Table, the user is sent back to the Home display. Users may then click the Make Ration button. The name of the selected feedstuffs is shown beside a cell where the amount to feed is entered. Nutrients provided by all amounts of all selected feedstuffs are shown in an adjacent column. Next to the nutrients provided column is the nutrients required column. REAFS highlights nutrients that are deficient or unacceptably excessive in the developing ration. When the problem nutrient(s) are fixed, the highlights disappear. Users may switch between two different displays of nutrient status: nutrient supply and nutrient concentration. Users may also view the nutrient contributions of individual feedstuffs. The latter is useful in troubleshooting a nutrient excess. Excel's Goal Seek feature may be used to quickly find the amount needed of a chosen feedstuff to deliver the amount of a specific nutrient that is shown to be deficient. From the Make Ration display, users may access the optimization feature. Optimization uses Excel's Solver. Solver may be used to find the least cost ration, the ration that results in the greatest profit, or the most efficient ration. Users may add, remove or modify the preset constraints on the Optimization page. From the Make Ration display, a function key may be used to run a macro that makes a mineral/vitamin premix to meet mineral and vitamin deficiencies in the otherwise acceptable ration.

Blend Feedstuffs button

Many rations will contain twenty or more feedstuffs. At least some of these are likely to be handled as a blended mixture on the farm. Users may blend all or just a portion of the ration's ingredients and use the blend in the ration. The blend name and analysis are placed on the Feed Table and the blend name, analysis and formula are available for printing. A calculation of the appropriate inclusion rate for non-nutritive additives is available at the blend display. Users begin by clicking on the Food and Drug Administration link to find information on the additive products. Pounds per ton of blend for the additive product is calculated.

View Blends button

The View Blends button allows users to see the blends in storage.

Print button

The print button offers several printout options. The two-page printout of the ration gives the date, the name of the author, inputted information about the animal/environment/management, the ration, the nutrients provided by the ration and the nutrients required by the animal. Nutrients are boxed where the amount provided is poorly matched with the amount required. A blend name, analysis and formula may be printed. A

feedstuff analysis may be printed. This may be useful to test the accuracy of forage analysis entry. The print button can be used to print out whole farm information (profitability, farm efficiency, animal and feedstuff inventories, feedstuff run-out dates and manure production).

Summary

REAFS is educationally-focused ration evaluation and formulation software for fourteen types of economically important animal types. Because all REAFS products are designed to operate with the same controls, learning efficiency is increased. REAFS is free to educators and their students thanks to industry sponsors. Sponsor information becomes part of the on-line feed library. The resulting communication between future customers/future employees and agricultural industries is mutually beneficial. New feedstuff analyses may be entered in to the on-line feed library, making them available to all REAFS users, worldwide. If instructors have farm information placed on REAFS' Facebook page, assignments can be shared creating new opportunities for communication, collaboration and competition.

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