

# USE OF PEGASUS TO ESTIMATE THE ECONOMIC VALUE OF ALFALFA HAY FOR HORSES

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The purchase of alfalfa hay, accounts for one of the largest cash expenditures for many horse enterprises. A computer program for formulating and evaluating horse rations, called "Pegasus" can be used to determine relative economic values of various lots of hay based on nutrient content, age, sex, weight, activity, environment, stage of pregnancy and stage of lactation of a horse and price of feedstuffs available for the ration.

To illustrate the use of the computer program for this purpose, a comparison was made of three lots of alfalfa hay with varying nutrient content. Hay lots were characterized by their digestible energy Mcal/lb, crude protein %, calcium %, phosphorus %, potassium %, sodium %, the minor minerals, and fat and water soluble vitamins on a 100 % dry matter basis.

Table 1 - Animal Information

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|       |                               |                        |
|-------|-------------------------------|------------------------|
| Title | line 1: Best hay buy          | Date: November 5, 1991 |
|       | line 2:                       | Wt unit: lb            |
|       | Body weight:                  | 500 lb                 |
|       | Expected mature body weight:  | 1100 lb                |
|       | Average daily gain:           | .500 lb                |
|       | Age:                          | 6 months               |
|       | In training? (Yes or No):     |                        |
|       | Digestible energy adjustment: |                        |

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Rations were formulated for a 500 pound foal in Table 1, with a mature weight of 1100 pounds gaining 1.50 pounds per day. Results of this analysis are shown in Table 1, 2, and 3.

Table 2 are feeds available along with individual prices. The ration for the foal is shown in Table 3.

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Table 2  
Feed List

| Lib Code | Feed No. | Name                 | PRICE \$/ton |
|----------|----------|----------------------|--------------|
| NEW      | 100      | Almond Hulls         | 74.00        |
| NEW      | 200      | T M Salt             | 176.00       |
| NEW      | 300      | VITE                 | 3800.00      |
| NEW      | 400      | Thiamin              | 1808.00      |
| STD      | 2        | ALFALFA HAY E BL     | 9999.00      |
| STD      | 3        | ALFALFA HAY F BL     | 9999.00      |
| STD      | 4        | ALFALFA HAY M BL     | 108.00       |
| STD      | 13       | BARLEY GRAIN         | 127.00       |
| STD      | 33       | CALCIUM PHOSPHATE    | 240.00       |
| STD      | 55       | CORN DENT GRAIN      | 136.00       |
| STD      | 63       | FAT ANIMAL HYDROL    | 253.00       |
| STD      | 92       | MOLASSES SUGARCANE   | 96.00        |
| STD      | 93       | OATS GRAIN           | 123.00       |
| STD      | 98       | OATS HAY SUN CURED   | 88.00        |
| STD      | 142      | SOYBEAN MEAL W/OHULL | 296.00       |
|          | 0        |                      | 0.00         |

Table 3  
All Feeds - in the ration for the FOAL

| ALL FEEDS<br>in the ration   | AS FED<br>BASIS: |        | DRY MATTER<br>BASIS: |        | ---Constraints---  |     |                     |     |
|------------------------------|------------------|--------|----------------------|--------|--------------------|-----|---------------------|-----|
|                              | lb/day           | %      | lb/day               | %      | As fed<br>-lb/day- |     | 100% DM<br>-%Total- |     |
|                              |                  |        |                      |        | min                | max | min                 | max |
| BARLEY GRAIN                 | 6.867            | 55.190 | 6.084                | 54.469 |                    |     |                     |     |
| ALFALFA HAY<br>MIDBLOOM      | 4.800            | 38.581 | 4.368                | 39.109 |                    |     |                     |     |
| SOYBEAN MEAL<br>WITHOUT HULL | 0.376            | 3.022  | 0.338                | 3.026  |                    |     |                     |     |
| MOLASSES/<br>SUGARCANE       | 0.306            | 2.457  | 0.289                | 2.583  |                    |     |                     |     |
| T M Salt                     | 0.062            | 0.500  | 0.062                | 0.557  |                    |     | 0.6                 | 0.6 |
| Thiamin                      | 0.013            | 0.108  | 0.013                | 0.120  |                    |     |                     |     |
| VITE                         | 0.012            | 0.094  | 0.009                | 0.084  |                    |     |                     |     |
| CALCIUM<br>PHOSPHATE         | 0.006            | 0.049  | 0.006                | 0.052  |                    |     |                     |     |
| Total Ration..               | 12.442           |        | 11.169               |        |                    |     |                     |     |
| Cost, \$/day...              | 0.81             |        |                      |        |                    |     |                     |     |
| Cost, \$/ton...              | 129.56           |        | 144.33               |        |                    |     |                     |     |

Best buy feeds are shown in Table 4. Opportunity price for alfalfa hay early bloom is \$121.20. Best buy for alfalfa hay full bloom at opportunity price is \$109.35. In the second set of computer formulations, Table 6, the animal information was changed to an 1100 pound lactating mare. Feeds for this ration are listed in Table 5.

Table 4 - Best Buy Feeds for the FOAL

|         |                       |         |         |         |          |
|---------|-----------------------|---------|---------|---------|----------|
| NEW 200 | T M Salt              | 9.96221 | 176.00  | -10.19  | 1715.08  |
| NEW 300 | VITE                  | 0.01166 | 3800.00 | -4.92   | 20522.27 |
| NEW 400 | Thiamin               | 0.01338 | 1808.00 | -5.88   | 6631.83  |
| STD 4   | ALFALFA HAY MIDBLOOM  | 4.80011 | 108.00  | 105.16  | 119.92   |
| STD 13  | BARLEY GRAIN          | 6.86655 | 127.00  | 123.20  | 131.65   |
| STD 33  | CALCIUM PHOSPHATE     | 0.00604 | 240.00  | 75.72   | 768.20   |
| STD 92  | MOLASSES SUGARCANE    | 0.30566 | 96.00   | -329.35 | 98.66    |
| STD 142 | SOYBEAN MEAL W/O HULL | 0.37595 | 296.00  | 267.31  | 304.80   |

| <u>F E E D S</u> <u>N O T</u> <u>U S E D</u> |                      | -----Price as fed, \$/ton----- |                    |
|--|----------------------|--------------------------------|--------------------|
|  |                      | <u>At formulation</u>          | <u>Opportunity</u> |
| NEW 100                                      | Almond Hulls         | 74.00                          | 61.17              |
| STD 2  | ALFALFA HAY EARLY BL | 9999.00                        | 121.20             |
| STD 3  | ALFALFA HAY FULL BL  | 9999.00                        | 109.35             |
| STD 55                                       | CORN DENT GRAIN      | 136.00                         | 120.03             |
| STD 63                                       | FAT ANIMAL HYDROL    | 253.00                         | 241.02             |
| STD 93                                       | OATS GRAIN           | 123.00                         | 115.03             |
| STD 98                                       | OAT HAY SUN CURED    | 88.00                          | 48.43              |

The ration results as shown in Table 5

Table 5 - All Feeds in Ration for the LACTATING MARE

| ALL FEEDS<br>in the ration | AS FED<br>BASIS: |        | DRY MATTER<br>BASIS: |        | ---Constraints---  |     |                     |        |
|----------------------------|------------------|--------|----------------------|--------|--------------------|-----|---------------------|--------|
|                            | lb/day           | %      | lb/day               | %      | As fed<br>-lb/day- |     | 100% DM<br>-%Total- |        |
|                            |                  |        |                      |        | min                | max | min                 | max    |
| ALFALFA HAY                |                  |        |                      |        |                    |     |                     |        |
| MIDBLOOM                   | 10.529           | 45.250 | 9.582                | 45.632 |                    |     |                     |        |
| BARLEY GRAIN               | 10.020           | 43.063 | 8.878                | 42.280 |                    |     |                     |        |
| OATS HAY                   |                  |        |                      |        |                    |     |                     |        |
| SUN CURED                  | 1.564            | 6.721  | 1.443                | 6.755  |                    |     |                     |        |
| FAT ANIMAL                 |                  |        |                      |        |                    |     |                     |        |
| HYDROL                     | 0.447            | 1.921  | 0.422                | 2.010  |                    |     |                     |        |
| MOLASSES                   |                  |        |                      |        |                    |     |                     |        |
| SUGARCANE                  | 0.447            | 1.921  | 0.422                | 2.010  |                    |     |                     |        |
| T M Salt                   | 0.116            | 0.500  | 0.116                | 0.554  |                    |     |                     | 0.60.6 |
| CALCIUM                    |                  |        |                      |        |                    |     |                     |        |
| PHOSPHATE                  | 0.088            | 0.380  | 0.086                | 0.409  |                    |     |                     |        |
| Thiamin                    | 0.034            | 0.145  | 0.034                | 0.161  |                    |     |                     |        |
| VITE                       | 0.023            | 0.098  | 0.018                | 0.087  |                    |     |                     |        |
| Total Ration...            | 23.269           |        | 20.997               |        |                    |     |                     |        |
| Cost, \$/day...            | 1.45             |        |                      |        |                    |     |                     |        |
| Cost, \$/ton...            | 124.32           |        | 137.77               |        |                    |     |                     |        |

The comparative value of 3 different hays for the lactating mare are shown in Table 6 alfalfa hay early bloom has an opportunity price of \$115.28 and alfalfa hay full bloom \$102.94. Alfalfa hay mid bloom has a lower range of \$104.49 and upper range of \$112.58.

Table 6 - Best Buy Feeds for the LACTATING MARE

|         |                      |          |         |         |          |
|---------|----------------------|----------|---------|---------|----------|
| NEW 200 | T M Salt             | 0.11634  | 176.00  | -8.95   | 13931.45 |
| NEW 300 | VITE                 | 0.02280  | 3800.00 | -3.80   | 31601.81 |
| NEW 400 | Thiamin              | 0.03382  | 1808.00 | 657.32  | 8055.36  |
| STD 4   | ALFALFA HAY MIDBLOOM | 10.52916 | 108.00  | 104.49  | 112.58   |
| STD 13  | BARLEY GRAIN         | 10.02010 | 127.00  | 120.47  | 131.65   |
| STD 33  | CALCIUM PHOSPHATE    | 0.08864  | 240.00  | -8.98   | 626.94   |
| STD 63  | FAT ANIMAL HYDROL    | 0.44702  | 253.00  | -67.09  | 271.00   |
| STD 92  | MOLASSES SUGARCANE   | 0.44702  | 96.00   | -155.21 | 114.03   |
| STD 142 | OATS HAY SUN CURED   | 1.56390  | 88.00   | 83.44   | 91.50    |

-----Price as fed, \$/ton-----

| <u>FEEDS NOT USED</u> |                       | <u>At formulation</u> | <u>Opportunity</u> |
|-----------------------|-----------------------|-----------------------|--------------------|
| NEW 100               | Almond Hulls          | 74.00                 | 70.91              |
| STD 2                 | ALFALFA HAY EARLY BL  | 9999.00               | 115.28             |
| STD 3                 | ALFALFA HAY FULL BL   | 9999.00               | 102.94             |
| STD 55                | CORN DENT GRAIN       | 136.00                | 127.20             |
| STD 93                | OATS GRAIN            | 123.00                | 113.96             |
| STD 142               | SOYBEAN MEAL W/O HULL | 296.00                | 164.77             |

It is apparent that Pegasus can be used by buyers and sellers of alfalfa hay to establish relative economic values that are closely associated with the actual feeding value of alfalfa hay, depending on the animal, his or her age performance, activity, stage of pregnancy or lactation, environment and feed prices.

#### References

National Research Council. 1989. Nutrient Requirements of Horses. Fifth Revised Edition. National Academy Press Washington D.C.

Pegasus Users' Manual. 1990. Department of Animal Science, University of California, Davis.