

## Perennial Peanut: Forage Nutritional Composition and Feeding Value<sup>1</sup>

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Perennial peanut (*Arachis glabrata*; also known as rhizoma peanut) is a warm-season legume that grows well in the lower southeastern United States. This legume is grown for hay, silage and pasture, and as ornamental ground cover. Perennial peanut fills a unique niche in this region because there is no other perennial warm-season legume that rivals its forage quality, persistence, and broad spectrum of uses. Presently, it is commercially produced primarily in north Florida and south Georgia. Most of this production is for hay--in particular, for horses.

Temperate perennial forage crops such as alfalfa (*Medicago sativa*) do not grow well in the lower southeastern United States. Yields of 6000 to 11,000 lb of perennial peanut hay per acre are common (Prine and French, 1999; Hill 2002). There is a high value market for hay from perennial peanut in the southeastern United States, in particular to horse owners, as an alternative to expensive alfalfa hay that is shipped in from other parts of the country (Degner, et al. 2003).

Perennial peanut production acreage is increasing, but it is still a relatively new crop grown on about 30,000 acres in north Florida and south Georgia (Perennial Peanut Producers Assoc.). Limited information is currently available on the nutritional value of this forage. This publication summarizes nutritional composition data and results of animal feeding studies, including studies with horses.

Perennial peanut hay should not be confused with “peanut hay” which is made from the residue after pod/seed harvest of the annual peanut (*Arachis hypogaea*). There is more information available on the nutrient composition of annual peanut hay than perennial peanut forage. However, this annual peanut hay is not desirable for horses as it is dusty, is almost entirely stems, and is relatively low in nutritional value (Hill 2002).

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1. This document is AN234, one of a series of the Animal Sciences Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date February 2010. Visit the EDIS Web Site at <http://edis.ifas.ufl.edu>.
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## Nutritional Composition of Perennial Peanut Hay

Table 1 below summarizes composition information and quality indices of perennial peanut hay. This summary represents sampling from 31 different farms located in south Georgia and north Florida from 2005 to 2009 (mostly 2007 and 2008). Unfortunately, no information about maturity, cutting, or variety was recorded. It is assumed that the forage was harvested with the intent to produce good quality hay (primarily for horses), and that most of the submissions were the 'Florigraze' cultivar because it is the most widely grown variety. For comparison, the typical composition of pre/early bloom alfalfa hay is also given in the table.

As noted in the table, the average composition of perennial peanut hay compares very closely with that of alfalfa hay. However, a wide variation in the composition of perennial peanut hay was noted. This variation is probably the result of many factors including maturity at harvest, time of cut (first cut vs. second), amount of weed and grass contamination, weather conditions prior to and at harvest, soil fertility, etc. Because of this variation, each lot of hay purchased or produced should be analyzed for forage quality.

## Nutritional Value for Livestock

In research studies conducted in Florida and Georgia, perennial peanut forage has been found to be highly nutritious for beef and dairy cattle, and goats (Gelaye et al., 1990; Williams et al., 1991; Hammond et al., 1992; Bennett et al., 1995; Staples et al., 1997; Hernández-Garay et al., 2004; Williams et al., 2004). Gelaye et al. (1990) reported that goats fed perennial peanut hay actually had slightly greater digestibility of dry matter, fiber, and protein than those fed the alfalfa hay control. The goats also voluntarily ate more perennial peanut hay than alfalfa hay. Hammond et al. (1992) found that perennial peanut forage is a suitable protein and energy supplement feed for wintering cattle, especially for those on low protein grass hay. Thus, for ruminant animals (cattle, sheep and goats) perennial peanut is very nutritious and well liked. The nutritional quality of perennial peanut appears to be as good as alfalfa.

## Nutritional Value for Horses

Not much is known, however, about the nutritional value of perennial peanut for horses. To date only two research studies have been conducted – Lieb et al. (1993) and Eckert (2008). These two studies found perennial peanut hay to be very similar to alfalfa in digestible energy, as well as dry matter, crude protein, and fiber (NDF) digestibilities. A summary of the results is presented in Table 2. For comparison, similar studies conducted with alfalfa hay are also summarized in Table 2.

Eckert (2008) also conducted an *in vitro* study to evaluate the potential digestibility of various perennial peanut hays. *In vitro* (Latin for “within the glass”) procedures simulate digestion by animals in the laboratory. The most common *in vitro* digestibility procedures were developed to simulate digestion by cattle. There are now procedures to simulate digestion by horses. One such procedure was used to evaluate several perennial peanut hays, including hays of two new perennial peanut varieties. The results of the *in vitro* study are summarized in Table 3. For comparison, good quality alfalfa hay was also included in the *in vitro* study. The *in vitro* digestibility of all perennial peanut hays was as good as or greater than that of alfalfa. An exception was with 'Arbrook' variety which had a slightly lower digestibility than alfalfa. However, all perennial peanut hays had very good digestibility. A sample of the perennial peanut hay used in the horse digestibility study of Eckert (2008) was saved and included in the *in vitro* analysis. The digestibility determined *in vitro* was very similar to the digestibility determined *in vivo* (“within the animal”; 68% vs. 66%)

## Palatability of Perennial Peanut Forage

Perennial peanut forage is well liked by ruminant animals and horses. As noted above, goats actually preferred perennial peanut hay over alfalfa hay. Perennial peanut hay typically has finer stem texture than alfalfa hay. This is desirable from an intake perspective, especially for horses. Lieb et al., (1993) observed that the voluntary intake by horses was greater for perennial peanut hay than for alfalfa hay.

However, in a horse preference study by Eckert (2008), no differences were noted for quantity consumed or the time spent eating perennial peanut or alfalfa hays. The reason(s) for the different results between the two horse studies is not known, but may be the result of differences in hay quality and/or hay texture.

### Feeding Tips for Perennial Peanut Hay

Perennial peanut is very nutritious and in most cases has more nutrition than what is needed by the animal. Perennial peanut forage is best used where the high nutritional value would be of most benefit such as for developing replacement beef heifers, or where a producer can get a high financial return such as selling hay for horses.

### Feeding Tips for Horses

Since perennial peanut hay is very palatable, care should be taken to prevent over consumption by horses. Because of its high nutritional value, there would be few instances in which perennial peanut hay should be self-fed to horses. Perennial peanut hay is best used as a supplemental feed to other feeds such as grass hay. For example, a mature 1,000 pound, light activity horse (two hours or less riding per day) in good condition eating 16 to 20 pounds per day requires about one pound of protein and ten pounds of total digestible nutrients (TDN; energy) per day. This requirement can be met with 14 to 16 pounds of bermudagrass hay plus two to four pounds of perennial peanut hay per day.

#### Related EDIS Publications:

*Perennial Peanut: A Quick Reference:*  
<http://edis.ifas.ufl.edu/ag329>

*Perennial Peanut: Alternative Forage of Growing Value:* <http://edis.ifas.ufl.edu/AA148>

*Marketing Opportunities for Perennial Peanut Hay:* <http://edis.ifas.ufl.edu/FE424>:

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**Table 1.** Typical composition of perennial peanut hay grown in south Georgia and north Florida (100% dry matter basis).<sup>a</sup>

Item	Average <sup>b</sup>	Possible Range <sup>c</sup>	Alfalfa Hay <sup>b</sup>
Crude Protein	14	11 – 20	19
Neutral Detergent Fiber (NDF) <sup>e</sup> , %	42	36 – 56	40
Acid Detergent Fiber (ADF) <sup>f</sup> , %	32	24 – 38	32
Lignin <sup>g</sup> , %	9	7 - 12	8
Total Mineral Matter (Ash), %	10	8 - 12	10
Total Digestible Nutrients (TDN) <sup>h,k</sup> , %	60	54 – 68	62
Horse Digestible Energy (DE) <sup>k</sup> , Mcal/lb	1.1	0.9 – 1.3	1.13
Relative Feed Value (RFV) <sup>i,k</sup>	145	100 - 190	150
Relative Forage Quality (RFQ) <sup>i,k</sup>	140	100– 180	150
Calcium (Ca), %	1.3	1.1 – 1.7	1.3
Phosphorus (P), %	0.2	0.2 – 0.3	0.2
Potassium (K), %	1.4	0.6 – 1.8	1.8
Magnesium (Mg), %	0.5	0.3 – 0.7	0.4
Copper (Cu), ppm	6	4 – 12	12
Zinc (Zn), ppm	34	24 - 52	30

<sup>a</sup>Summary of analyses done by the University of Georgia Feed and Environmental Water Analytical Lab from 2007 to 2009 and analyses done by and for the University of Florida Animal Sciences Dept from 2005 to 2009.

<sup>b</sup>From analyses of 42 hay samples for each item except the minerals which were from 5 hay samples.

<sup>c</sup>The range was based on a combination of deviation analysis of the analyses of each item and what has been reported previously in the literature (summarized by Eckert, 2008).

<sup>d</sup>Early bloom; from NRC (1989) tables values and from the feed/forage library of Dairy One Coop. Inc., Analytical Lab., Ithaca, NY.

<sup>e</sup>NDF is a measure of soluble and insoluble fiber concentration in a feed/forage.

<sup>f</sup>ADF is a measure of insoluble fiber concentration.

<sup>g</sup>Lignin is a part of the insoluble fiber fraction that is largely indigestible.

<sup>h</sup>TDN is a measure of the relative energy or feed value of a feed/forage, the higher the number, the higher concentration of energy.

<sup>i</sup>RFV is an index to estimate forage nutritional quality relative to that of full bloom alfalfa hay which is 100; the higher the number, the higher the quality.

<sup>j</sup>RFQ is similar to RFV but takes into account differences in digestible fiber; RFV and RFQ values are usually similar for legume forages of similar nutritional quality.

<sup>k</sup>DE, TDN, RFV, and RFQ are calculated by the labs using composition analyses results.

**Table 2.** Summary of studies evaluating the digestibility of perennial peanut and alfalfa hays in mature horses (*in vivo* digestibility), % of dry matter.

Study	Forage	Apparent Digestibility, %			
		Dry Matter	Organic Matter	Crude Protein	NDF <sup>a</sup>
Eckert, 2008	Per. Peanut	65	66	67	45
Lieb et al., 1993	Per. Peanut	56	ND <sup>b</sup>	70	43
Lieb et al., 1993	Alfalfa	62	ND	79	45
Crozier et al., 1997	Alfalfa	58	ND	73	47
LaCaha et al., 1999	Alfalfa	63	74	83	44

<sup>a</sup>NDF = neutral detergent fiber.  
<sup>b</sup>ND = not determined.

**Table 3.** *In vitro* digestibility of perennial peanut and alfalfa hays, % of dry matter.<sup>a</sup>

Species	Variety	Year	IVTD, <sup>b</sup> %
Per. Peanut	Florigraze	2005 <sup>c</sup>	68
Per. Peanut	Florigraze	2006	68
Per. Peanut	Florigraze	2006	68
Per. Peanut	Arbrook	2006	66
Per. Peanut	UF-Tito <sup>d</sup>	2006	76
Per. Peanut	UF-Peace <sup>d</sup>	2006	70
Alfalfa <sup>e</sup>	(Unknown)	2006	71

<sup>a</sup>Horse specific *in vitro* procedure used; all samples were done at one time; SE = 2; from Eckert, 2008.  
<sup>b</sup>IVTD = *in vitro* true digestibility (% dry matter disappearance).  
<sup>c</sup>Same hay that was used in the *in vivo* horse digestibility study of Eckert (2008; Table2).  
<sup>d</sup>Recently released varieties  
<sup>e</sup>Hay was purchased locally; early bloom; origin: Iowa.