STRIP CUTTING ALFALFA FOR LYGUS MANAGEMENT: FORAGE QUALITY IMPLICATIONS

Shannon C. Mueller, Charles G. Summers, and Peter B. Goodell[1]

ABSTRACT

Strip cutting is used to limit lygus migration from alfalfa into susceptible neighboring crops. Hay growers are concerned that the uncut strips negatively impact quality and marketability of alfalfa from subsequent cuttings. The objective of this trial was to determine if blending the hay from the uncut strips with the new growth could mitigate reductions in quality and improve marketability. There were negative impacts of mixing old hay with the new growth alfalfa in both 2000 and 2001. As old growth was added in 25% increments to the new forage in the bale, crude protein values declined by 1 to 2% and ADF values increased by 1 to 3.5%. Since ADF is used to calculate TDN, increases in ADF will have a significant impact on the value of the forage. There was no significant reduction in crude protein value when 7 or 14% old growth alfalfa was present in bales as compared to bales containing 100% new growth. With respect to ADF, the only significant difference was between the new hay and the hay containing 14% old growth. When visually evaluating hay, there appear to be subtle changes in appearance when old growth is blended with new growth that can be detected. The most sensitive characteristics are color and overall quality. Growers need to assess the requirements of their market, and determine the best strategy for managing the alfalfa strips left in fields for the purpose of lygus management based upon the expected reductions in quality reported here.

Key Words: Alfalfa, Lygus Management, Strip Cutting, Forage Quality, Maturity

INTRODUCTION

Strip cutting has been evaluated as a management strategy to limit lygus migration from alfalfa into susceptible neighboring crops. Strip cutting involves leaving uncut strips of alfalfa in the field to provide habitat for insect pests and beneficial species. These strips are cut every other harvest, leaving new strips during alternate harvests. Hay growers have concerns that the uncut strips containing more mature alfalfa will negatively impact quality and marketability of alfalfa. The objective of this trial was to determine if blending the hay from the uncut strips with the new growth during subsequent swathing, raking, and baling operations could mitigate reductions in quality and improve marketability.

PROJECT DESCRIPTION

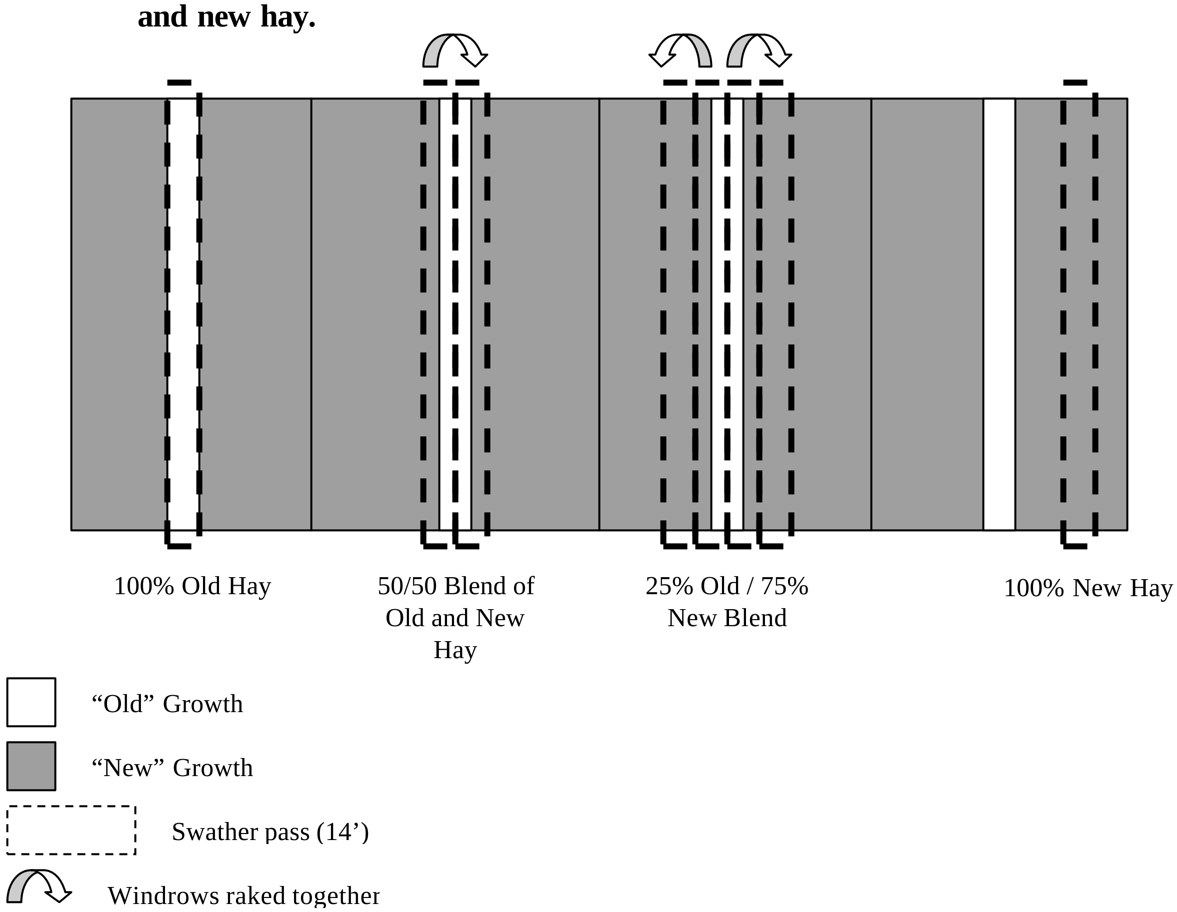
Three alfalfa fields located at the Kearney Agricultural Center in Parlier, CA were used in this project during the 2000, 2001, and 2002 production seasons. All of the fields used in 2000 had been planted with alfalfa variety 'WL 516' in November 1995. The 2001 fields were planted in

[1] S.C. Mueller, Agronomy Farm Advisor, UC Cooperative Extension, 1720 S. Maple Avenue, Fresno, CA 93702, scmueller@ucdavis.edu; C.S. Summers, Entomologist, UC Davis and Kearney Ag Center, 9240 S. Riverbend Avenue, Parlier, CA 93648, chasum@uckac.edu; P.B. Goodell, Area IPM Advisor, Kearney Ag Center, 9240 S. Riverbend Avenue, Parlier, CA 93648, ipmpbg@uckac.edu.

October 2000 to the alfalfa variety 'SW 9301'. Two of the fields sampled in 2002 were the same as those used in 2001. The third was a field planted in November 1999 to an unknown blend. All alfalfa fields at the Kearney Ag Center were strip cut during harvest to manage lygus bug populations in susceptible neighboring crops.

Because strip cutting involves leaving an uncut strip of alfalfa in the field during harvest, management of that over mature strip during the subsequent harvest becomes an issue. In these trials, the previously uncut strips were approximately 56 days old at harvest, when the balance of the field was 26-28 days old. The term "old" hay refers to the hay from the previously uncut strip, and the "new" hay is alfalfa that has grown only since the last cutting, usually in a 26-28 day period. Most growers elect to harvest the previously uncut strip and create a new strip during the subsequent harvest rather than leaving it uncut throughout the season. Strategies for blending the old growth with new growth to mitigate reductions in quality were evaluated in this trial. Bales with various compositions of old and new growth were created in the field during the swathing and raking process (Figure 1).

Figure 1. Swathing and raking process used to create bales of desired composition of old and new hay.



In 2000 and 2001, if the swather cut the entire "old" strip (14' wide), and it was maintained as a single windrow during raking, bales from that windrow contain 100% old hay. Likewise, if a previously uncut strip ("old" hay) was completely avoided during swathing and raking, the bales from those windrows contain 100% new hay. To create the 50/50 blend of old and new hay, the swather divided the previously uncut strip in half (7' + 7'). The two adjacent windrows each contain 50% old and 50% new hay. They can be raked together into one large windrow, retaining the 50/50 composition at baling. To create bales composed of 25% old and 75% new hay, the strip of old growth was split in half by the swather as in the previous example. The two resulting windrows are a 50/50 blend of old and new growth. Instead of raking them together, they are raked with an adjacent windrow of 100% new growth so the resulting windrow is a mixture of 50/50 and 100% new hay, creating a final bale composition of 25% old / 75% new hay.

In 2002, different bale compositions were created - 100% new growth, 7% old / 93% new growth, and 14% old / 86% new growth. To achieve these compositions, the swather left uncut strips approximately 4' wide when the field was cut (instead of 14' wide as in 2000 and 2001). If the entire strip was taken in one swather pass, and mixed with an adjacent windrow of 100% new growth alfalfa, then the resulting bale was 14% old growth and 86% new growth. If the 4' strip was split in half during a swather pass, and mixed with an adjacent windrow of new growth, then the resulting bale was 7% old growth and 93% new growth. If the swather avoided a previously uncut strip, bales from that windrow would contain 100% new growth.

Bales of varying composition from three cuttings each year were randomly selected in the field and moved to a storage yard where they were stored in individual stacks (4-8 bales each). In 2000, the stacks were stored in a covered pole barn and in 2001 and 2002 they were stored uncovered along the edge of the runway at the Kearney Agricultural Center in Parlier, CA. Within the first month or two of storage, all bales within a stack were sampled using a Penn State coring device attached to an electric drill. Bales were probed at the end of the bale near the center, penetrating at least 12-18 inches into the bale. The probe was held at a right angle to the bale end. The cores from each stack were composited and placed in a sealed zip-lock bag. Samples were stored at room temperature, light, and humidity until the end of the season. Each sample was analyzed for moisture (dry matter), crude protein (CP), and acid detergent fiber (ADF). Total Digestible Nutrients (TDN) and Net Energy for Lactation (NEL) were calculated using the measured ADF values. Bales remained in storage until quality was evaluated in the fall by an independent hay broker/animal nutritionist based upon visual characteristics.

Harvest Dates Sampled	**Bale Composition**
6/21/00	100% new growth
8/16/00	25% old/75% new
9/13/00	50% old/50% new
	100% old growth
6/6/01	100% new growth
7/5-6/01	25% old/75% new
8/31/01	50% old/50% new
	100% old growth
5/30/02	100% new growth
7/25/02	7% old/93% new
9/19/02	14% old/86% new

FORAGE QUALITY DATA SUMMARY

Dry Matter

Dry matter (DM) is used to determine the amount of water in hay or silage. Most hay is sold on a 90% DM basis. Dry matter affects only tonnage, not forage quality. However, extremely low moisture could indicate brittleness or excessive leaf loss and high moisture could indicate the potential for mold growth.

There was no significant effect of bale composition on the dry matter content of the hay in any year (Table 1). There were significant differences in the moisture content of samples from the individual harvest dates each year. In 2000 and 2001, samples from the June cutting had a lower average moisture content than samples from the later cuttings. In 2002, samples from both June and July had lower average moisture contents than the September cutting.

Crude Protein

Crude protein (CP) is calculated from the nitrogen content of the forage. The majority of the protein is found in the leaf fraction. Protein contributes energy and provides essential amino acids to the animals that consume the forage. The more protein that comes from the forage, the less the ration must be supplemented to provide for animal requirements.

In 2000, there was a significant interaction between the date of harvest and the composition of the bale on crude protein values. Crude protein values were highest in September-harvested samples (19.2%), followed by June (18.5%) and August (17.2%). Date of harvest effects can be explained by weather conditions during the growth cycle and the maturity of the alfalfa when cut. Higher temperatures and longer cutting intervals negatively impact forage quality by increasing the stem fraction to the detriment of the leaf fraction. Within a cutting, crude protein values decline as the alfalfa matures. In 2001 and 2002, no significant interaction between date of harvest and bale composition was observed.

In both 2000 and 2001, as the percentage of older hay in the bale increased, crude protein values declined significantly, as would be expected due to the increased proportion of mature, more fibrous stem tissue and lower leaf content (Table 1). In 2002, when the proportion of old hay in the bale was lower, 7 or 14% as compared to 25 or 50% in previous years, significant effects on crude protein levels were not detected.

In 2002, there were significant differences in crude protein with date of harvest. June- and September-harvested alfalfa had higher CP levels (21.0 and 21.4, respectively) than the mid-summer (July) cutting, which was 3% lower at 18%. Summer hay is known to have lower quality in general than hay from spring or fall cuttings.

Acid Detergent Fiber

Acid Detergent Fiber (ADF) consists primarily of lignin and cellulose located in the cell walls of plants. As alfalfa matures and the stems become more lignified, ADF values increase. The rate of maturation increases with increasing temperature during the growth cycle. ADF has a strong negative correlation with total forage digestibility. As ADF increases, forage quality declines as evidenced by reductions in both intake and digestibility.

Date of harvest had significant effects on the fiber content as measured by acid detergent fiber analysis in two out of three years. In 2000, fiber values were highest in the samples collected from the June harvest (33.8%) and lower in the August and September cuttings (29.5% and 28.7%, respectively). The cutting interval was 28 days in June, 26 days in August, and 28 days in September. The shorter cutting interval in August and cooler temperatures in September probably contributed to slightly lower fiber values during those cutting cycles as compared to June. In 2001, fiber values were highest in July (36.7%), followed by August (33.9%) and June (31.9%). Since all cutting intervals were 27-28 days, the timing of high summer temperatures probably contributed more to the effect on fiber values. In 2002, there were no significant differences in ADF values between cuttings. Values ranged from 28.7 in September to 30.1 in July.

Each year, ADF values followed the expected pattern with respect to composition of the bale - values increased significantly as the percentage of old hay in the bale increased (Table 1). In 2002, the ADF values from 7% old / 93% new blended bales were not significantly different from values from 100% new hay bales. However, blending 14% old hay into the bales resulted in ADF values significantly higher than the 100% new hay bales.

Total Digestible Nutrients and Net Energy of Lactation

Total Digestible Nutrients (TDN) and Net Energy of Lactation (NEL) are calculated from ADF and are used to estimate the energy value of forages. The equations can be found at the bottom of Table 1. Hay in California is most often bought and sold based on its TDN value, especially in the dairy market. Hay with a TDN value greater than 55.9% (at 90% DM) is designated as Extra Premium, and is quite desirable for high producing dairy cows. Premium quality hay has a TDN value between 54.5 and 55.9%, and is also quite desirable. Good quality hay is defined by having a TDN value between 52.5 and 54.5%. If hay tests between 50.5 and 52.5% TDN, it is designated as fair quality and would not be suitable for dairy animals. However, this does not mean the hay is not marketable. There are many other markets for hay with TDN values below dairy quality standards, such as beef and horse markets.

NEL estimates the energy in forage available to support an animal's energy requirement for lactation. It is most often used for balancing dairy cattle rations. The purpose of hay quality guidelines incorporating estimates of TDN or NEL is to help promote a common language for trading hay, and to aid in the understanding of forage quality. Designations are based upon historical experience and the biological relationships between hay quality and milk production.

Based upon TDN, the average quality of the *best* alfalfa in these trials was only “Good” in 2000 and 2002, and declined below that to “Fair” in 2001. Using TDN as the sole criterion, additions of old growth to the bales dropped quality designations into the next lowest category, even when only 7% old growth was added. Since the research station does not attempt to grow hay to meet the demand for high quality desired by the dairy market; the cutting interval is longer and quality is generally lower. However, relative differences in quality between the various composition treatments gives an indication of what can be expected if a grower blends the old forage with new growth.

Table 1. The Influence of Bale Composition on Selected Quality Parameters as Detemined by Chemical Analysis.

Bale Composition	Percent Moisture	% Crude Protein	ADF (%)	TDN (%)	NEL Mcal/lb	Dairy Quality Designation
2000						
100% New Hay	10.7	20.6 a	28.6 d	52.7 a	0.60 a	Good
25% Old/75% New	10.6	18.8 b	30.0 c	51.6 b	0.58 b	Fair
50% Old/50% New	10.7	17.4 c	31.4 b	50.5 c	0.57 c	Fair
100% Old Hay	10.9	16.5 d	32.7 a	49.6 d	0.56 d	Below Fair
p-value (0.05)	*ns*	*0.0000*	*0.0000*	*0.0000*	*0.000*	
2001						
100% New Hay	9.8	20.0 a	31.2 c	50.7 a	0.57 a	Fair
25% Old/75% New	9.9	18.8 b	33.3 b	49.1 b	0.55 b	Below Fair
50% Old/50% New	10.4	17.7 c	34.4 b	48.3 b	0.54 b	Below Fair
100% Old Hay	9.6	16.1 d	37.9 a	45.7 c	0.51 c	Below Fair
p-value (0.05)	*ns*	*0.0000*	*0.0000*	*0.0000*	*0.0000*	
2002						
100% New Hay	8.2	20.9	28.3 a	53.1 a	0.60 a	Good
7% Old/93% New	8.1	20.2	29.4 ab	52.1 ab	0.59 ab	Fair
14% Old/86% New	8.0	19.3	30.4 b	51.4 b	0.58 b	Fair
p-value (0.05)	*ns*	*ns*	*0.0271*	*0.0189*	*0.0333*	

CP, ADF, and TDN are reported at 90% DM. NEL is reported at 100% DM.

TDN = 82.38 - (0.7515 X ADF)
NEL = ((0.0245 x TDN) - 0.12)/2.204

VISUAL EVALUATION OF QUALITY

Predicting forage quality is not an exact science. Both visual inspection and laboratory analysis provide clues as to the potential feeding value of hay. These techniques are best used in combination because there are certain characteristics that cannot be evaluated by standard chemical analysis, such as the presence of weeds, mold, and physical problems, and the reverse is also true - it is impossible to determine crude protein content by simply looking at the hay. For that reason, in this trial, an independent consultant rated the hay on a variety of visual characteristics. Each year, all ratings were made on a single day to limit variability (11/13/00, 10/11/01, and 10/23/02). Some different characteristics were evaluated in 2000 as compared to 2001 and 2002, so the information is summarized separately (Tables 2, 3, and 4).

2000 Visual Evaluation Summary (Table 2)

Growth Stage - Based upon a visual assessment, the consultant believed that the hay in 32 out of the 36 stacks was harvested at less than 10% bloom, the recommended stage of maturity. In the June cutting, his ratings singled out the mixed forage based upon visible maturity differences. On a scale from 1 to 3, the average maturity ratings for that cutting increased from 1.0 for 100% new hay to 1.17 for 25/75, 1.33 for 50/50, and 1.5 for 100% old hay.

Foreign Material - The majority of the stacks were found to have little or no foreign material present in the bales. Only three stacks out of 36 were identified as having some foreign material.

Leafiness - Leafiness was evaluated on a scale from 1 to 3, with 1 indicating very leafy hay and 3 indicating stemmy hay. There were no significant differences in the ratings of leafiness from the different harvest dates or bale composition treatments. Leaf shatter was also assessed visually. Shattered leaves were noted in 2/3 of all bales evaluated. If the leaves remain in the bale, although separate from the stems, the quality of the forage is retained in a total mixed ration. However, if the hay was too dry when raked or baled and leaves were shattered and left in the field, the rating would indicate stemmy hay.

Color/Odor - Color and odor are important characteristics that indicate how well the hay was cured in the field and preserved in the bale. Heating, with subsequent browning, and mold growth occurs in hay that was baled too wet. Dusty hay with excessive leaf shatter results from baling with too little moisture. The consultant noted that odor did not appear to be a problem in any of the lots. Any discount in the rating from this evaluation was for color. Both date of harvest and bale composition significantly affected the color of the hay in the bale. The hay that was put up in August and September had better color than the hay put up in June. On the scale from 1 (good) to 3 (discolored), the color rating of the August and September bales was 1.3 and the rating for the June bales was 2.3. Color of the bales containing new hay or the 25/75 mixed hay was generally rated higher than color of bales containing 50/50 mixed hay or 100% old hay.

Moisture - By twisting and tearing the hay, the consultant estimated the moisture content of the bale. Results from his evaluation corresponded quite well to the laboratory analysis for moisture. There was no significant difference in moisture related to the composition of the bales, but the bales from the June and August cuttings were significantly drier than the bales from the September cutting. This is not surprising considering the length of time they had been stored prior to visual evaluation.

Quality - A final overall quality designation was assigned using a scale of 1 to 5 with 1 indicating high quality and 5 very low quality. The consultant's visual evaluation of quality was consistent with the TDN rankings reported earlier. There were both date of harvest and bale composition differences in quality. The June-harvested hay was of lower quality (2.3 on a 5point scale) than hay from the August or September cuttings (1.3 on a 5-point scale). Overall, the visual ratings indicated good quality. With respect to bale composition, the better ratings were for the 100% new and the 25/75 mixed hay bales (1.3 and 1.4, respectively). The 50/50 mixed hay bales were rated 1.8 on a 5-point scale and the 100% old hay received a score of 2.1.

Table 2. The Influence of Harvest Date and Bale Composition on Selected Quality Parameters as Determined by Visual Analysis, 2000.

	Growth Stage	Leafiness	Color/Odor	Moisture	Overall Quality
Cutting					
June	1.25 b	1.25	2.33 b	10.0 a	2.3 b
August	1.00 a	1.21	1.33 a	10.6 a	1.3 a
September	1.00 a	1.38	1.25 a	12.2 b	1.3 a
p-value (0.05)	*0.0219*	*ns*	*0.0000*	*0.0000*	*0.0000*
Bale Composition					
100% New Hay	1.00	1.33	1.50 ab	10.7	1.3
25% Old/75% New	1.06	1.11	1.33 a	10.9	1.4
50% Old/50% New	1.11	1.28	1.89 b	11.2	1.8
100% Old Hay	1.17	1.39	1.83 b	10.9	2.1
p-value (0.05)	*ns*	*ns*	*0.0162*	*ns*	*0.005*

2001 Visual Evaluation Summary (Table 3)

Weeds and Foreign Material - The hay from the three fields harvested during 2001 was generally very clean. There were few weeds and the presence of foreign material was very low. There were no significant differences detected.

Leaf Quality **-** Leaf quality was significantly influenced by the cutting cycle. June-harvested bales had a significantly higher leaf quality score (1.9) than the July-harvested bales (2.6). August-harvested bales fell in between, scoring 2.4. Average leaf quality scores for the individual bale composition treatments ranged from 2.0 to 2.5, and were not significantly different from one another.

Color **-** Both date of harvest and bale composition had a significant impact on the color rating. June-harvested bales had better color than July- or August-harvested bales, and bales containing 100% new growth had better color than bales containing 100% old growth. The worst scores were for two bales that contained 100% old growth; they rated 3.75 and 4 on a 5-point scale.

Odor **-** There were no significant differences in aroma of the hay in the individual stacks as a result of harvest date or bale composition. Only one bale was noted to have a particularly bad odor. It contained 100% old growth and was harvested in August. It received a score of 4 on a 5-point scale.

Rain Damage or Heavy Dew - The rating scale ranged from 1 = no effect from rain or heavy dew to 5 = extensively damaged. This score was only influenced by harvest date. The June -harvested bales had an average score of 1.5 while the July- and August-harvested bales had average scores of 2.3 and 2.1, respectively.

Visible Mold or Dustiness - There were no significant differences in visible mold or dustiness as a result of harvest timing or bale composition. Three bales had some spots of mold and were scored 2 or 3. Only one bale was scored 4.5, indicating excessive mold. It was harvested in August and contained 100% old growth.

***Moisture* -** There were significant differences in moisture detected by twisting and tearing the hay from the different cuttings. June- and July-harvested bales were drier than August-harvested bales. This is not unexpected considering the length of time the stacks sat exposed to the elements following harvest.

***Overall Quality* -** After evaluating each stack, the consultant gave a final score for overall quality. The scale ranged from 1 = best overall quality to 5 = worst quality. In 2001, cutting date was the only factor that influenced overall quality. June-harvested bales had higher quality than July- and August-harvested bales. The composition of the bale did not significantly affect the overall quality score.

Table 3. The Influence of Harvest Date and Bale Composition on Selected Quality Parameters as Determined by Visual Analysis, 2001.

	Leaf Quality	Rain or Dew	Moisture	Color	Overall Quality
Cutting					
June	1.90 a	1.52 a	9.74 a	1.85 a	2.00 a
July	2.60 b	2.27 b	10.13 a	2.88 b	3.15 b
August	2.42 ab	2.06 b	11.46 b	2.60 b	2.71 b
p-value (0.05)	*0.0302*	*0.0177*	*0.0018*	*0.0005*	*0.0034*
Bale Composition					
100% New Hay	2.03	1.67	10.39	2.22 a	2.42
25% Old/75% New	2.39	1.92	10.10	2.17 ab	2.31
50% Old/50% New	2.33	1.97	10.22	2.50 ab	2.58
100% Old Hay	2.47	2.25	11.06	2.89 b	3.17
p-value (0.05)	*ns*	*ns*	*ns*	*0.0446*	*ns*

2002 Visual Evaluation Summary (Table 4)

A rating scale from 1 to 5 was used where 1 was "poor" and 5 was "excellent". There were no significant interactions between date of harvest and bale composition on any of the visual estimates of quality.

Weeds and Foreign Material - The hay from the three fields harvested during 2002 was generally very clean. There were few weeds and the presence of foreign material was very low. There were no significant differences detected.

***Leaf Quality* -** Leaf quality was significantly influenced by the cutting cycle. June- and July-harvested bales had a significantly higher leaf quality score than the September-harvested bales. Average leaf quality scores for the individual bale composition treatments ranged from 3.5 to 3.7, and were not significantly different from one another.

***Color* -** Neither date of harvest nor bale composition had a significant impact on the color rating. Average values ranged from 3.6 to 3.8 on a 5-point scale.

***Odor* -** There were no significant differences in the aroma of the hay in the individual stacks as a result of harvest date or bale composition. Average values were between 3.7 and 4.0.

***Rain Damage or Heavy Dew* -** There was no significant effect of cutting cycle or bale composition on rain damage or heavy dew. Values ranged from 3.6 to 4.0.

***Visible Mold or Dustiness* -** None of the bales showed any signs of mold. There were no significant differences in dustiness as a result of bale composition, but cutting cycle differences were detected. Bales harvested in July were significantly dustier than bales harvested in September.

***Moisture* -** There were significant differences in moisture detected in the hay from the different cuttings. June- and July-harvested bales were drier than September-harvested bales. This is not unexpected considering the length of time the stacks were exposed to the elements following harvest. Bale composition did not significantly influence moisture content.

***Overall Quality* -** After evaluating each bale, the consultant gave a final score for overall quality. The scale ranged from 1 = worst overall quality to 5 = best quality. There were no significant cutting date or composition effects on overall quality. Average values ranged from 3.5 to 3.9.

Table 4. The Influence of Harvest Date and Bale Composition on Selected Quality Parameters as Determined by Visual Analysis, 2002.

	Leaf Quality	**Rain or Dew**	**Moisture**	**Color**	**Overall Quality**
Cutting					
June	3.89 a	3.61	8.44 a	3.69	3.92
July	3.75 a	3.83	8.39 a	3.58	3.53
September	3.19 b	4.00	10.72 b	3.75	3.89
p-value (0.05)	*0.0056*	*ns*	*0.0000*	*ns*	*ns*
Bale Composition					
100% New Hay	3.69	3.67	9.17	3.58	3.94
7% Old/93% New	3.61	4.00	9.11	3.72	3.75
14% Old/86% New	3.53	3.78	9.28	3.72	3.64
p-value (0.05)	*ns*	*ns*	*ns*	*ns*	*ns*

SUMMARY

Alfalfa growers recognize the importance of producing a high quality product, both in terms of appearance and nutritional value. Quality has a profound impact on animal performance and consequently the price or value of alfalfa hay. There were clear-cut negative impacts of mixing old hay with the new growth alfalfa in both 2000 and 2001. As old growth was added in 25% increments to the new forage in the bale, crude protein values declined by 1 to 2% and ADF values increased by 1 to 3.5%. Seasonal, or cutting cycle, effects were also detected each year, but there was no interaction between cutting cycle and bale composition effects.

Since ADF is used to calculate TDN, the basis of marketing, increases in ADF will have a significant impact on the value and marketability of the forage. In these trials, about 1 percentage point TDN was lost for each addition of 25% old growth. In a typical California dairy market, blending 50% of the old growth with 50% new forage could mean a reduction of 2% TDN. This could mean a significant difference in the selling price if the alfalfa dropped from the premium category to the fair category. Hay with a low TDN can still be sold, usually just not to the dairy market. There are markets less sensitive to low TDN values, where buyers base decisions on a combination of visual and chemical characteristics.

When lesser amounts of old growth alfalfa were blended into the bale, chemical changes were not as large. There was no significant reduction in crude protein value when 7 or 14% old growth alfalfa was present in bales as compared to bales containing 100% new growth. With respect to ADF, the only significant difference was between the new hay and the hay containing 14% old growth. Adding 7% old growth alfalfa to the bale did not significantly increase ADF. Since TDN is calculated from ADF, reductions in TDN corresponded to changes in ADF values. There was a reduction of 1.7% TDN with the addition of 14% old growth.

Reductions in laboratory-measured quality values as old growth alfalfa was blended with new growth were consistent over the three years that this study was conducted. However, the effect of altering bale composition on visual appearance of the bales was less clear-cut. Some of the negative affects of blending old with new hay may have been masked by overall poor quality of the hay in these trials. Since the hay was lower quality to begin with, increases in the proportion of old growth in the bale may not have been as striking upon visual inspection. There do appear to be subtle changes in the appearance of bales when old growth is blended with new growth that can be detected during visual examination. The most sensitive characteristics appear to be color and overall quality.

Growers need to assess the requirements of their market, and determine the best strategy for managing the alfalfa strips left in fields for the purpose of lygus management. If the majority of the field produces hay suitable for the dairy market, it may be best to segregate bales from the uncut strips and market them separately since as little as 14% old hay can be detected in chemical analysis. Alternatively, if the balance of the hay is not destined for the dairy market, blending the old growth with new growth may be the most efficient strategy to handle the forage from the uncut strip. Blending 7 or 14% old hay into bales containing new growth were not detected upon visual inspection.