

# Suitability of Triticale, either as a Mono-crop or in a Blend with Annual Ryegrass as Pasture Forage for Grazing by Growing Beef Cattle during the Cool Season

Bob Myer, Ann Blount, Cheryl Mackowiak, and Ron Barnett<sup>1</sup>

Forage triticale is suitable for cool-season pastures for grazing by growing beef cattle.

## Summary

A two-yr, 2 x 2 factorial study was conducted to evaluate the suitability of triticale forage, either as a mono-crop or in a blend with annual ryegrass, for grazing by growing beef cattle during the cool season. These two triticale treatments were compared to rye forage, either as a mono-crop or in a blend with ryegrass. The triticale ('TriCal 342'), rye ('Wrens Abruzzi') and their respective blends with annual ryegrass, ('Venture') were planted into clean-tilled pastures during early November (Yr 1) or late Oct. (Yr 2). In all, 8, 1.6 acre pastures were planted each year (two replicates). For each year, 16 tester growing beef heifers (Yr 1; 537 ± 59 lb avg. body wt.) or steers (Yr 2; 559 ± 147lb) divided among two blocks were used. Grazing started in late January and lasted until April or May of each year. Overall, estimated forage dry matter yield, animal grazing days and cattle body weight gain per acre were not affected ( $P > 0.05$ ) by pasture forage species; however, average daily weight gain of tester cattle tended to be greater ( $P = 0.04$ ) for triticale vs. rye treatments. Blending ryegrass with the forage cereals resulted in longer grazing periods ( $P < 0.001$ ), and increases in forage yield ( $P < 0.001$ ), grazing days ( $P < 0.001$ ), and gain per acre ( $P < 0.001$ ) with no species by mono-crop vs. blend interaction; however, a species by year interaction ( $P = 0.04$ ) was obtained for forage dry matter yield in that the triticale was better than rye in Yr 1 and rye better than triticale in Yr 2. The triticale pastures were more even in forage availability during the cool season whereas rye tended to have a large "spike" in forage growth during the early spring. The results suggest that forage

*triticale is suitable for cool-season pastures, especially if blended with annual ryegrass, for grazing by growing beef cattle.*

## Introduction

In the Coastal Plain region of the Southeastern United States, the planting of cool-season annuals such as annual ryegrass (*Lolium multiflorum* L.), oat (*Avena sativa* L.), and (or) rye (*Secale cereale* L.) is common to provide grazing or harvested as green chop and (or) silage for cattle during the winter-spring season (typically from December to May). New forage varieties of triticale (*X Triticosecale* Wittmack) have gained popularity in this region by dairy producers for silage and green chop. We are not aware of any trials on the evaluation of these newer triticale varieties as pasture forage for grazing by growing beef cattle during the cool season. Additionally, there is some evidence from research conducted elsewhere that triticale may be a more suitable crop in a blend with annual ryegrass than rye (Myer and Lozano del Rio, 2004). We hypothesize that a new variety of forage triticale will be suitable forage, especially if blended with annual ryegrass, for grazing by growing beef cattle.

The objective of this study was to evaluate the suitability of triticale forage, either as a mono-crop or in a blend with annual ryegrass, for grazing by growing beef cattle during the cool season.

## Materials and Methods

This study was conducted at the University of Florida's North Florida Research and Education

<sup>1</sup>Department of Animal Sciences, North Florida Research and Education Center, University of Florida Marianna, FL

Center (NFREC) located near Marianna in northwest Florida. The study evaluated two forage types – rye or triticale, and two different planting methods – planted as mono-crops (rye or triticale alone) or planted in a blend with annual ryegrass. The study was conducted over two consecutive yr – fall 2008 to spring 2009, and fall 2009 to spring 2010.

For each yr, eight 1.6-acre fenced pastures were used. The pastures were prepared by deep plowing followed by disc harrowing, and the forages were planted using a grain drill. Recommended (UF/IFAS) seeding rates were used and initial fertilization and rates were based on soil analysis. The recommended wheat (for forage) seeding rates were used for triticale. The pastures were planted during the second wk of November for Yr 1 and during the last wk of October for Yr 2. Grazing was started when the forage was about 8 to 12 in in height within a pasture. Grazing was continued until there was a lack of adequate forage for grazing within a pasture. The variety of triticale was ‘TriCal’ 342, rye was ‘Wrens Abruzzi’ and annual ryegrass was ‘Venture’. All pastures over both yr were grown under dry land conditions. All pastures were top dressed twice with nitrogen fertilizer, each time with 60 lb of N/acre; sulfur was also top dressed during the first application (12 lb/acre).

For each yr, 16 growing Brangus, Brangus x Angus, Brahman, Romosinuano or Romosinuano x Angus heifers (Yr 1) and steers (Yr 2) were used (average initial weight of  $537 \pm 59$  and  $559 \pm 147$  lb for Yr 1 and 2; respectively). The animals were allotted equally within each of the two replicates into groups of two based on initial weight and genetic background. Pasture treatment was assigned at random to the groups within replicate. Cattle were weighted at start and end of grazing as well as every 28 d while grazing. All weights were taken after an overnight fast. The two cattle allotted to each pasture each yr were known as “tester” cattle. “Put and take” cattle (extra cattle

from the same calf crop as the “testers”) were utilized when available forage in the pastures was greater than the “tester” cattle could graze. The number and days the “put and take” cattle used for each pasture were recorded. Water and complete high magnesium cattle mineral were available free choice at all times while the cattle were grazing.

Forage samples were collected from small enclosed un-grazed areas in each pasture to estimate forage dry matter yield (DMY), and to determine crude protein (CP) and in vitro dry matter digestibility (IVOMD). Data collected included weight gain of the “tester” cattle, animal grazing days (“tester” plus “put and take” cattle), and estimated pasture forage DMY and pasture forage quality (CP, IVOMD). Data were analyzed as a 2 x 2 factorial design combined over yr. The model included the four pasture treatments and the two main effects. The main effects evaluated included main pasture forage species (rye vs. triticale) and pasture planting method (mono-crop vs. blend with annual ryegrass).

## Results and Discussion

For each yr, grazing began late January – later than typical. We have started as early as late November in previous research utilizing prepared seed bed (clean tilled) pastures (Myer and Blount, 2007). The late start may have due to late planting for Yr 1, due to dry conditions, and because of unusually cold conditions that occurred during December and January for Yr 2, even though the pastures for Yr 2 were planted near the optimum time of mid to late October.

The average length of grazing was greater ( $P > 0.001$ ) for the blend pastures compared to the mono-crop pastures (Table 1). The average length of grazing of the triticale containing pastures was greater ( $P = 0.007$ ) than the rye containing pastures mainly due to the triticale/ryegrass pastures lasting longer than the rye/ryegrass pastures (forage species by mono-crop vs. blend interaction,  $P = 0.09$ ; Table 1).

Overall, estimated pasture forage DMY, animal grazing d/ acre and cattle body weight gain per acre were not affected ( $P > 0.05$ ) by pasture forage species. However, average daily weight gain of tester cattle tended to be greater ( $P = 0.04$ ) for the triticale treatments vs. rye (Table 1). Blending ryegrass with the forage cereals resulted in overall increases in forage DMY by 31% ( $P < 0.001$ ), grazing days by 32% ( $P = 0.001$ ), and calf weight gain per acre by 42% ( $P < 0.001$ ; Table 1). Average number of calves per acre was not affected by pasture forage species or mono-crop vs. blend ( $P > 0.05$ ).

With one possible exception, no species by mono-crop vs. blend interactions were noted ( $P > 0.05$ ). The possible exception was pasture DMY in that the increase in yield was greater ( $P = 0.06$ ) for triticale/ryegrass vs. triticale only than the increase for rye/ryegrass vs. rye only (Figure 1). A forage species by yr interaction, however, was obtained for pasture forage DMY ( $P = 0.04$ ). Additionally, a yr by species interaction was close to significance for total calf weight gain per acre ( $P = 0.06$ ). The triticale treatments did better than the rye treatments during Yr 1 and the opposite occurred during Yr 2 thus explaining the year effect. The reason triticale outperformed rye in one yr but not the next is unknown, but differences in climatic conditions did occur between the two years. Year 1 tended to have near normal temperatures with periodic dry periods lasting up to 21 d whereas Yr 2 can be characterized as cold and wet. The results of the two yr were combined as yr was considered a random effect and no three way interactions were noted.

Overall pasture forage DMY estimated every 3 wks during the two-yr study is shown in Figure 2 for the four individual treatments. The main effect of blend treatments vs. the mono-crop treatments is illustrated in Figure 3. Figure 4 shows the main effect of the rye treatments vs. the triticale treatments. Overall pasture forage yields were lowest early and late during the grazing periods with peak production occurring

in late March/early April. The increase in overall pasture forage yield of the blend treatments vs. the mono-crop treatments was mainly due to the increased yield of the blend treatments late in the grazing seasons ( $P < 0.01$  for the last two dates). This increase late in the grazing periods also explains the increases in grazing season length, animal grazing days and weight gain per acre mentioned above for the blend treatments. While overall there was no difference in pasture DMY between the triticale and rye containing pastures, the triticale pastures were noticeable more even in forage availability during the cool season whereas rye tended to have a large “spike” in forage growth during the early spring. The triticale pastures produced more forage early ( $P = 0.006$  for the first date) and less during mid-season ( $P < 0.001$  for the fourth date) than rye.

Overall forage quality as measured by CP concentration and IVOMD is presented in Table 1. Forage quality of samples taken every 3 wks during the grazing periods is summarized in Figures 5 and 6. Overall, average CP concentration was slightly lower ( $P < 0.01$ ) for the triticale treatments than the rye treatments; however, CP concentrations in the pasture forage were more than adequate for growing calves (requirement of 11 to 14%). As expected, both CP and IVOMD were very high at the start and then decreased (linear;  $P < 0.001$  for CP and IVOMD) as the grazing seasons progressed. The blend treatments overall had a slightly greater ( $P < 0.001$ ) IVOMD than the mono-crop treatments. This higher value was mainly due to higher IVOMD values of the blend treatments obtained late in the grazing periods (Figure 6).

The results suggest that forage triticale is suitable for cool-season pastures for grazing by growing beef cattle. Triticale tended to perform better than rye in a blend with annual ryegrass; however, more testing is required. The rather even distribution of forage growth for triticale over the grazing season would allow easier grazing management compare to rye. The results

also reinforce the advantages of planting a blend of forages as opposed to a mono-crop of a single species during the cool season.

### **References**

Myer, R. O. and A. R. Blount. 2007. 2007 Florida Beef Report, pp 19-24.

Myer, R. O. and A. J. Lozano. 2004. Triticale as Animal Feed. In *Triticale Improvement and Production* (M. Mergoum, ed). FAO, Rome, Italy. pp 49-58.

### **Acknowledgments**

Part of project Qun-03854; partial support provided by Resource Seeds Inc., Gilroy, CA (presently part of Sygenta).

The assistance of Harvey Standland, Jeff Jones, Don Jones, John Crawford, Richard Fethiere, Bill Smith, George Fohner, Brad Stevens, David Thomas, Olivia Hill Helms and Tina Gwin is gratefully acknowledged.

**Table 1.** Effect of pasture forage treatment and its main effects (means) on grazing season length and animal grazing days, on growth performance of growing beef cattle, and on pasture forage yield and quality.

| Item <sup>a</sup>         | Pasture forage treatment <sup>b</sup> |       |      |      |                 | Main means <sup>c</sup> |      |      |      |                 | P - value      |                |                  |
|---------------------------|---------------------------------------|-------|------|------|-----------------|-------------------------|------|------|------|-----------------|----------------|----------------|------------------|
|                           | Rye                                   | Trit. | RRG  | TRG  | SE <sup>d</sup> | RS                      | TS   | MT   | BT   | SE <sup>e</sup> | S <sup>f</sup> | T <sup>g</sup> | SxT <sup>h</sup> |
| Grazing season, d         | 77                                    | 80    | 101  | 112  | 1.8             | 89                      | 96   | 79   | 107  | 1.2             | 0.007          | 0.001          | 0.09             |
| <i>Cattle performance</i> |                                       |       |      |      |                 |                         |      |      |      |                 |                |                |                  |
| ADG, lb                   | 2.24                                  | 2.46  | 2.42 | 2.64 | 0.09            | 2.33                    | 2.55 | 2.35 | 2.51 | 0.07            | 0.04           | 0.11           | >0.30            |
| Avg. head/ac              | 2.0                                   | 1.7   | 1.8  | 1.7  | 0.1             | 1.9                     | 1.7  | 1.8  | 1.7  | 0.1             | 0.12           | >0.30          | >0.30            |
| Grazing days/ac           | 152                                   | 135   | 195  | 186  | 9.0             | 173                     | 160  | 143  | 190  | 6.4             | 0.20           | 0.002          | >0.30            |
| Gain/ac, lb               | 364                                   | 325   | 490  | 497  | 24              | 427                     | 409  | 344  | 491  | 17              | >0.30          | 0.001          | >0.30            |
| <i>Pasture forage</i>     |                                       |       |      |      |                 |                         |      |      |      |                 |                |                |                  |
| DM yield, lb/ac           | 4578                                  | 4307  | 5721 | 5913 | 105             | 5162                    | 5112 | 4453 | 5819 | 75              | >0.30          | 0.001          | 0.06             |
| CP, %                     | 22.5                                  | 19.2  | 21.8 | 19.7 | 0.5             | 22.2                    | 19.4 | 20.9 | 20.7 | 0.4             | 0.002          | >0.30          | >0.30            |
| IVOMD, %                  | 73.2                                  | 72.5  | 75.7 | 76.0 | 0.5             | 74.4                    | 74.2 | 72.8 | 75.8 | 0.3             | >0.30          | 0.001          | >0.30            |

<sup>a</sup> Gr. season = grazing season length in days. ADG = average daily weight gain, Avg. head/ac = average stocking density in number of head per acre, Gr. days/ac = average number of animal grazing days per acre, Gain/ac = average total weight gain per acre, DM yield = average pasture dry matter yield per acre, CP = crude protein as % of pasture forage dry matter, and IVOMD = in vitro organic matter digestibility as % of pasture forage dry matter<sup>7</sup>

<sup>b</sup>Trit. = triticale, RRG = rye and ryegrass blend, and TRG = triticale and ryegrass blend.

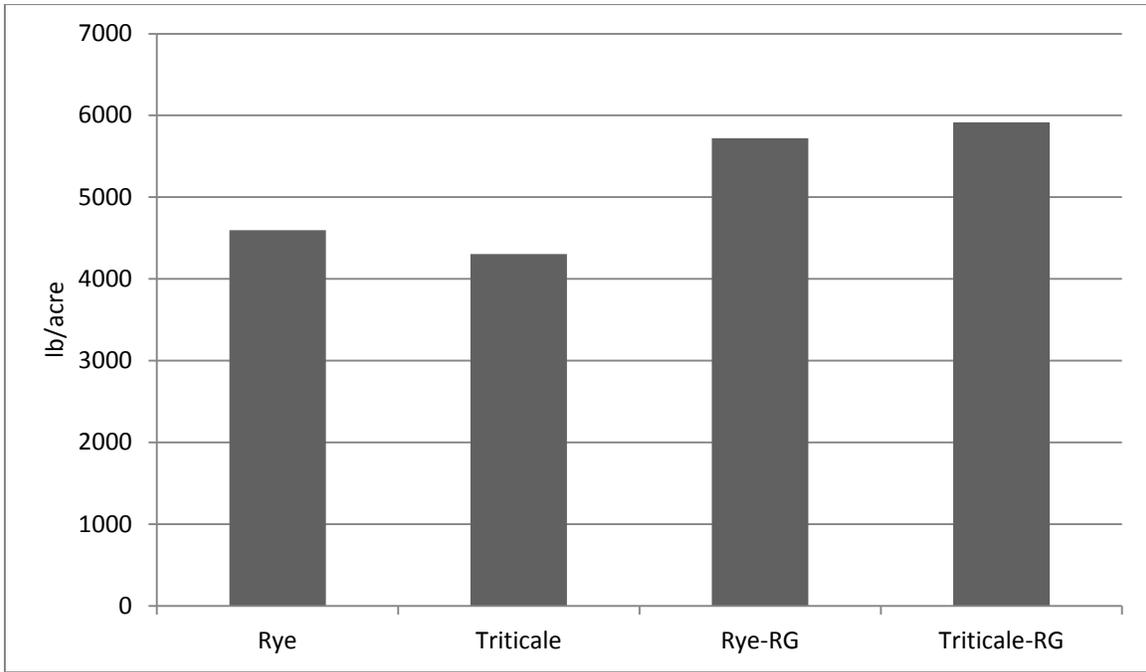
<sup>c</sup> RS = rye species – mean of rye and RRG treatments, TS = triticale species – mean of triticale and TRG treatments, MT = mono-crop treatments – mean of rye and triticale treatments, and BT = blend treatments – mean of RRG and TRG treatments.

<sup>d</sup>SE= standard error, n = 4; <sup>e</sup> n = 8.

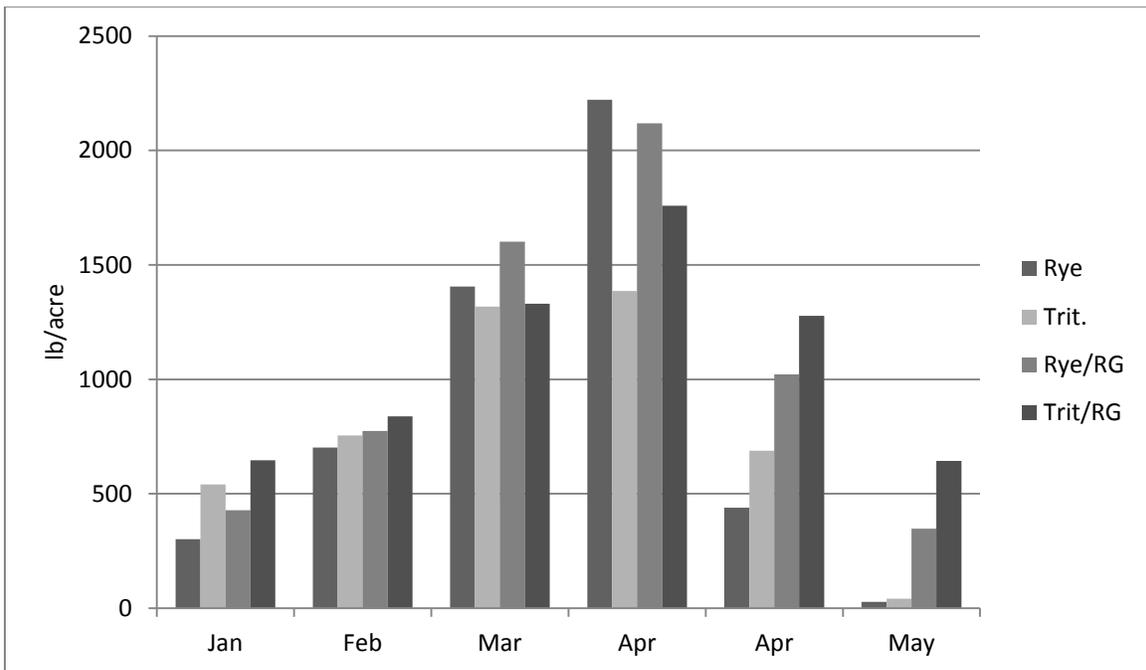
<sup>f</sup> S = species – effect of species (rye treatments of rye and RRG vs. trit treatments of trit and TRG).

<sup>g</sup> T = treatment – effect of treatment (mono-crop treatments of rye and trit vs. blend treatments of RRG and TRG).

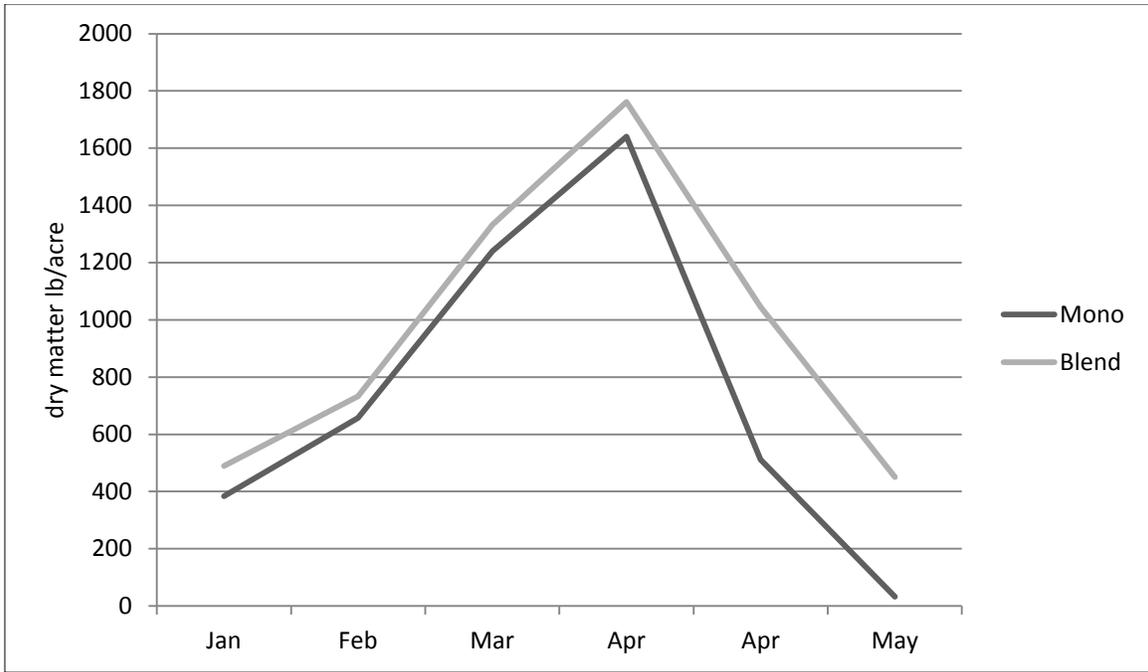
<sup>h</sup>SxT = species by treatment interaction.



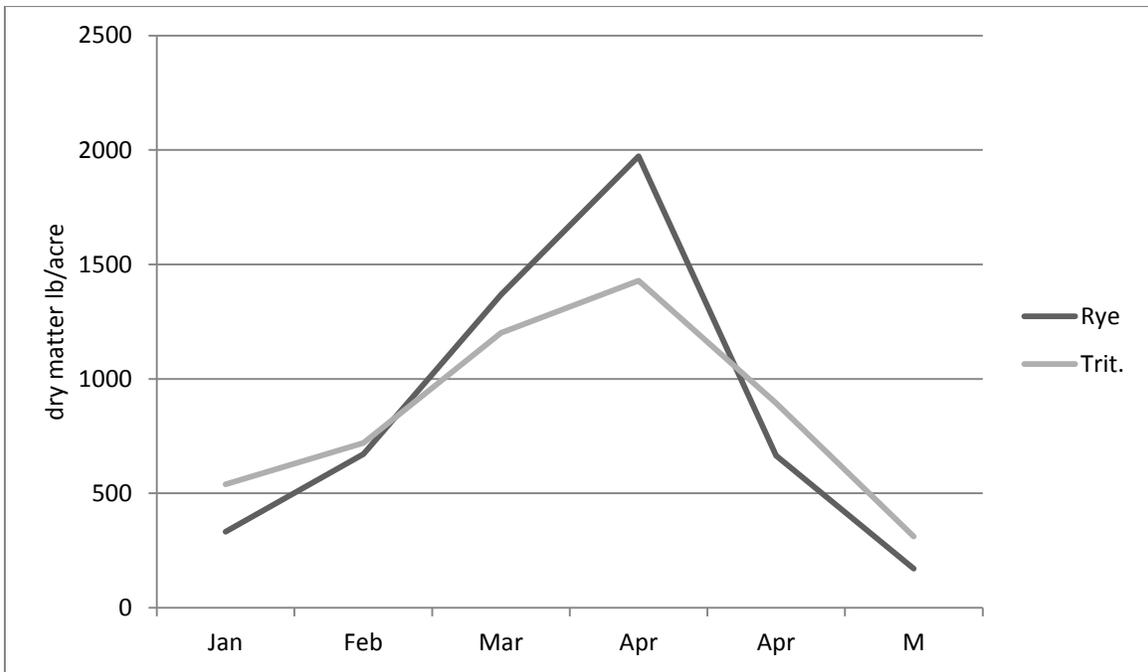
**Figure 1.** Overall average pasture forage dry matter yield of the four pasture treatments during the cool seasons (RG – ryegrass; SE = 105, n = 4; rye vs. trit.,  $P > 0.30$ ; mono-crop vs. blend,  $P < 0.001$ ; species x mono vs. blend,  $P = 0.06$ , and yr x species,  $P = 0.04$ ).



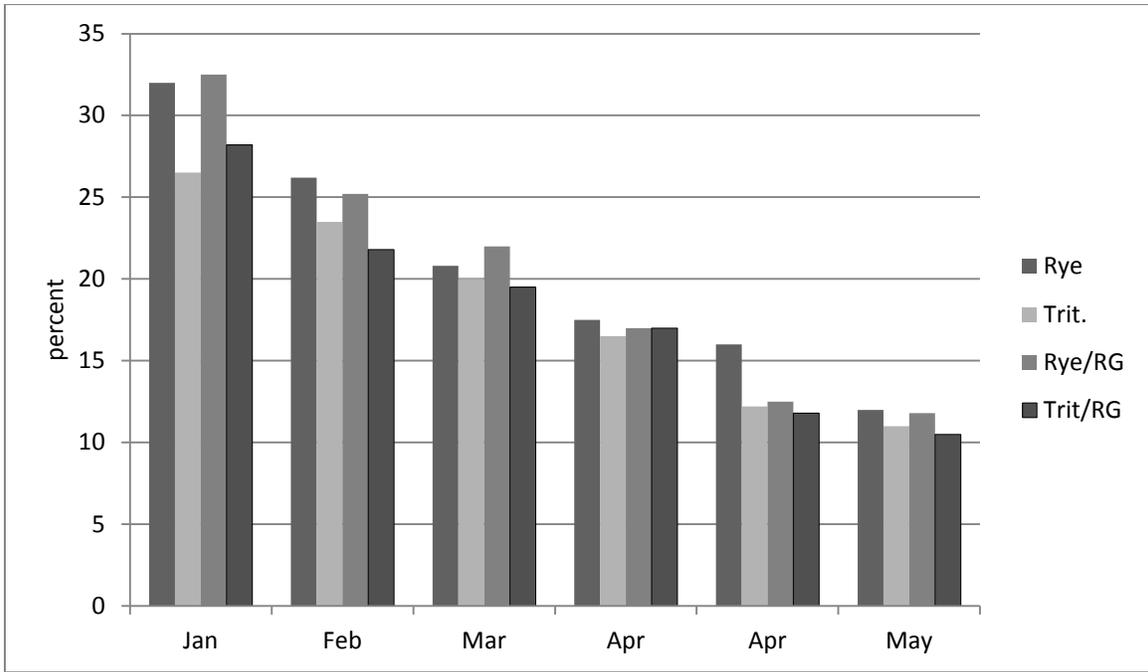
**Figure 2.** Average pasture forage dry matter yield measured every three wk of the four pasture treatments during the grazing seasons (RG – ryegrass; SE = 50, 52, 59, 75, 137, and 77 for the six sampling dates, respectively; n = 4).



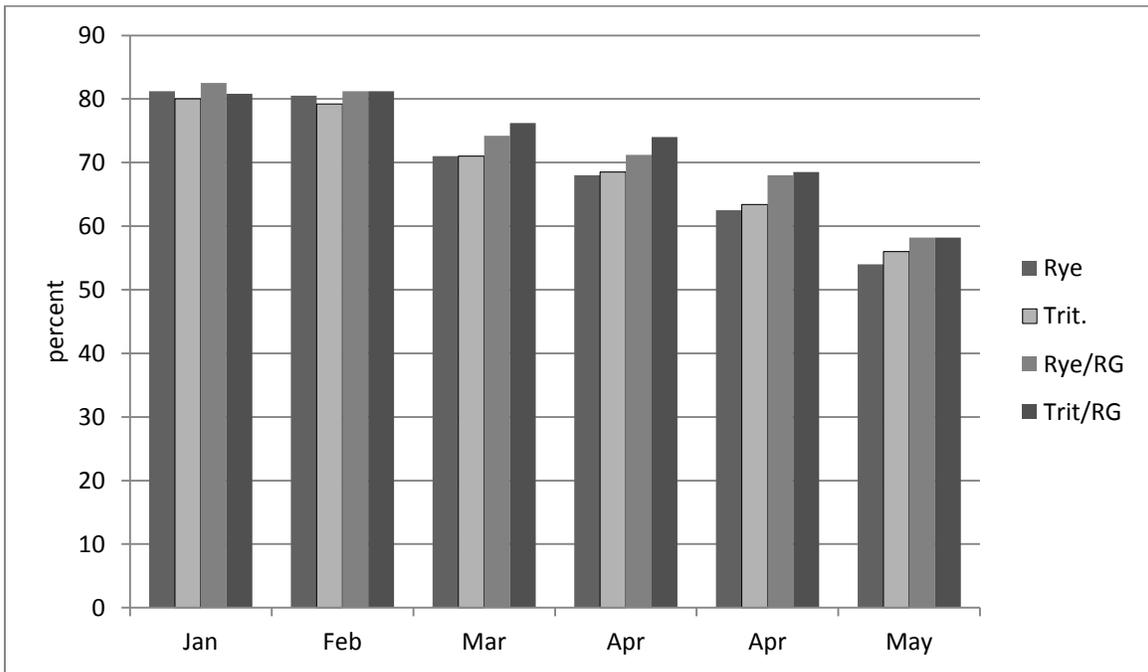
**Figure 3.** Effect of mono-crop (rye or triticale) vs. blend (rye or triticale with ryegrass) on estimated pasture forage amount every three weeks during the grazing season, lb dry matter/ac (SE = 35, 36, 42, 53, 96 and 55, and  $P = 0.08, 0.19, 0.16, 0.15, <0.001$  and  $0.002$  for the 6 sampling dates, respectively).



**Figure 4.** Effect of species (rye and rye + ryegrass vs. triticale and triticale + ryegrass) on estimated pasture forage amount every three weeks during the grazing season, lb dry matter/ac (SE = 35, 36, 42, 53, 96 and 55,  $P = 0.006, >0.30, 0.03, <0.001, 0.14$  and  $0.12$  for the six sampling dates, respectively).



**Figure 5.** Average pasture forage crude protein concentrations measured every three weeks during the grazing seasons, % dry matter basis (RG – ryegrass; SE = 0.8, 0.6, 0.2, 0.4, 0.5 and 0.8 for the six sampling dates, respectively; n = 4).



**Figure 6.** Average in-vitro organic matter digestibility (IVOMD) of pasture forage measured every three weeks during the grazing seasons, % dry matter basis (RG – ryegrass; SE = 0.3, 0.7, 0.8, 1.1, 1.9 and 1.0 for the six sampling dates, respectively; n = 4).