FORAGES

Annual Forage Trials - Seeding, Maintenance, and Harvest Information

Seeding			Maintenance						Harvest
			Fertilizer			Herbicide			
Date	Rate (plants per ft^{2})	Depth (in)	Date	Product	Rate (lbs ac^{-1})	Date	Product	Rate (L ac^{-1})	Date
Alternative									
June 6	See table	0.75	June 5 June 6	Urea S15	100 100	May 26	RoundUp (Glyphosate)	1	Sept 12
Barely, Oat, Spring/Winter Cereal, and Triticale									
May 21 £	30 £	1.5 £	May 21 £	Urea & S15 £ΦΩ ●	100 £ΦΩ ●	May 20	Heat LQ (Saflufenacil) & RoundUp (Glyphosate)	0.059 1	Aug 10 £
May 22 ΦΩ ●	30 Φ See table Ω 37 ●	1.5 ΦΩ ●	June 3 ΦΩ ●			June 14 £ΦΩ ●	Esteem (Fluoxypyr, Clopryralid, MCPA) £ΦΩ ●	0.24, 0.084, 0.281	Aug 11 £Φ Aug 15 Ω Aug 16 ●
Pulse/Cereal Mix									
May 21	See table	0.75	May 21	S15	100	May 20	Heat LQ (Saflufenacil) & RoundUp (Glyphosate)	0.059 1	Aug 15

£Barely Forage ΦOat Forage ΩSpring/Winter Cereal Forage ● Triticale Forage



Perennial Forage Trials - Seeding, Maintenance, and Harvest Information

Seeding			Maintenance								Harvest
			Fertilizer			Herbicide			Insecticide		
Date	Rate (lbs per ac^{2})	Depth (in)	Date	Product	Rate (lbs ac^{-1})	Date	Product	Rate (L ac^{-1})	Date	Product	Rate (L ac^{-1})	Date
Alfalfa Forage												
June 8, 2021	8	0.5	June 8, 2021	Urea S15	100 150	July 10, 2021 July 1, 2021 July 28, 2021 May 31	RoundUp (Glyphosate) Pardner (Bromoxynil) 2,4-D Amine (Phenoxy-carboxylic acid) Sencor (Metribuzin)	0.66 0.41 0.61 0.91	July 14, 2021	Coragen (Chlorantraniliprole)	0.101	***
Grass Forages												
June 8, 2021 July 13	See table	0.5 0.5	June 8, 2021	Urea S15	100 150	July 10, 2021 July 1, 2021 July 28, 2021 May 31	RoundUp (Glyphosate) Pardner (Bromoxynil) 2,4-D Amine (Phenoxy-carboxylic acid) Refine SG (Thifensulfuron & Triberunon)	0.66 0.41 0.61 12 g ac^{-2}	July 14, 2021	Coragen (Chlorantraniliprole)	0.101	July 7th
Mix Forages												
June 6, 2021 June 6, 2022	See table	0.75 0.75	June 6, 2021 June 6, 2022	S15 Urea S15	150 100 100	May 16, 2021 May 26 June 16	RoundUp (Glyphosate) Pardner (Bromoxynil)	0.66 1 0.4	July 14, 2021	Coragen (Chlorantraniliprole)	0.101	***
Sainfoin/Cicer Milkvetch												
June 8	35Φ 14ϟ	0.75	June 6, 2021	S15	150	May 16, 2021 May 26	RoundUp (Glyphosate)	0.66 1	July 14, 2021	Coragen (Chlorantraniliprole)	0.101	***

ΦSainfoin ϟCicer milkvetch

***Not harvested due to insufficient biomass

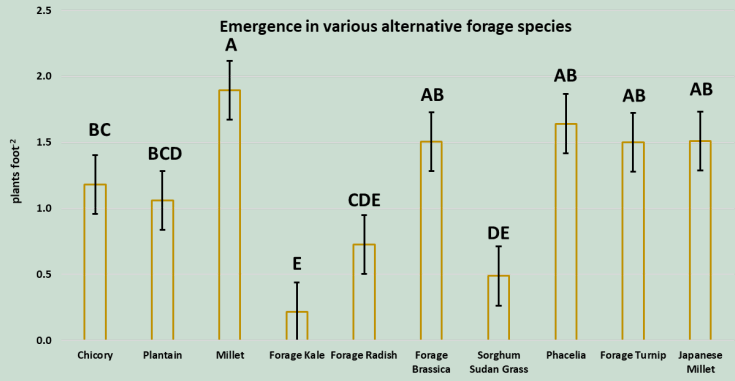


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Alternative

Highlights

- Ten plant species grown
- Emergence was greater in millet, Japanese millet, forage brassica and turnip as well as phacelia.
- Millet and Japanese millet were the most highest yielding
- Millet had more protein content, NDF, ADF and TDF compared to chicory and phacelia
- Millet is high on K, P, Mg but low in Na. Plantain and forage radish, on the contrary, are rich in Na
- Mix of either millet species with plantain or forage radish could be a great choice.



Annual Forages - Alternatives	
Variety	Seeding rate (lbs acre^{-1})
Chicory	10
Plantain	10
Millet	10
Forage kale	5
Forage radish	5
Forage brassica	10
Sorghum Sudan Grass	13
Phacelia	10
Japanese Millet	12
Forage Turnip	10

Emergence was greater in millet (P<0.0001) compared to forage kale. Number of emergent individuals in forage brassica, phacelia, forage turnip and Japanese millet were statistically like that in millet, whereas forage radish and sorghum sudangrass numbers were as low as those numbers of individuals found in forage kale.

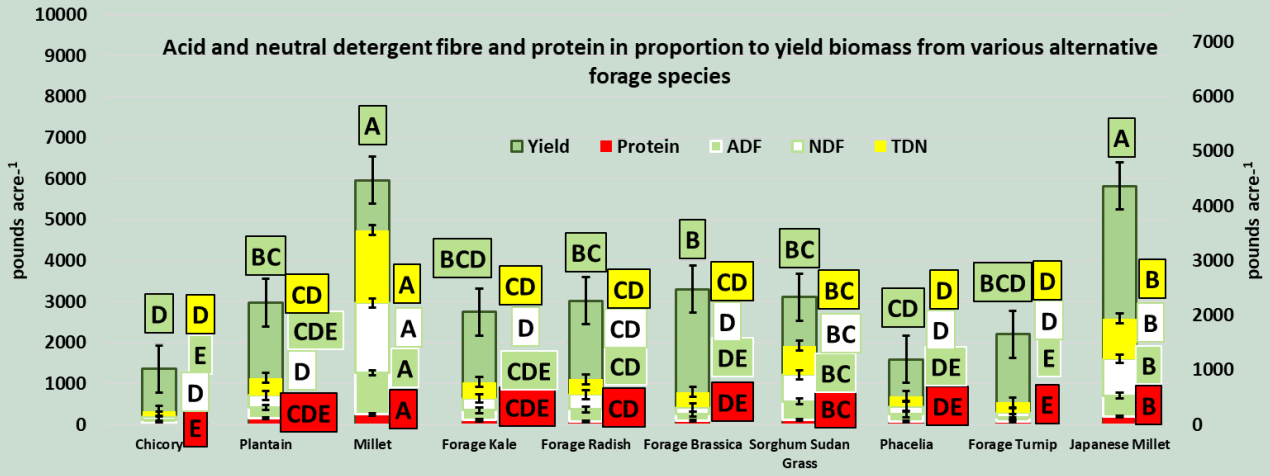
Yield in millet and Japanese millet exceeded yield from the other plant species (P<0.0001). Chicory, forage kale, phacelia and forage turnip were lower yielding, likely because they were outcompeted by weeds in mid June to July. Both millet species were high in protein content (P<0.0001) compared to chicory, phacelia, as well as forage radish, brassica, and turnip. Neutral and acid detergent fibre were found in its greatest amount in millet (P<0.0001 for both ADF and NDF). Neutral detergent fibre was deficient in all forage species, and also chicory, plantain, and phacelia. All these plant species except forage radish were found with low content of ADF. Millet was rich in total digestible nutrients in contrast to all forage plant species, chicory, plantain, and phacelia, whose TDN values were among the lowest.

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Alternative

Macronutrient content was significant according to plant species (P<0.0001) except Calcium (P=0.0743). Millet was rich in K, P, Mg but deficient in Na. Instead, plantain and forage radish were the plant species most rich in sodium content. Moreover, Sodium content was low in sorghum sudangrass, phacelia, forage turnip and Japanese millet. Potassium content was lacking in chicory, plantain, all forage plant species, and phacelia. Phosphorus and Magnesium content was less in the same plant species except Plantain. It can be argued that for alternative forage species a mix of either millet species with plantain or forage radish could be a great choice. This is because millets provide most of the feed biomass, protein, digestible nutrient and macronutrients, whereas plantain and forage radish can increase digestion and become a great source of Sodium.



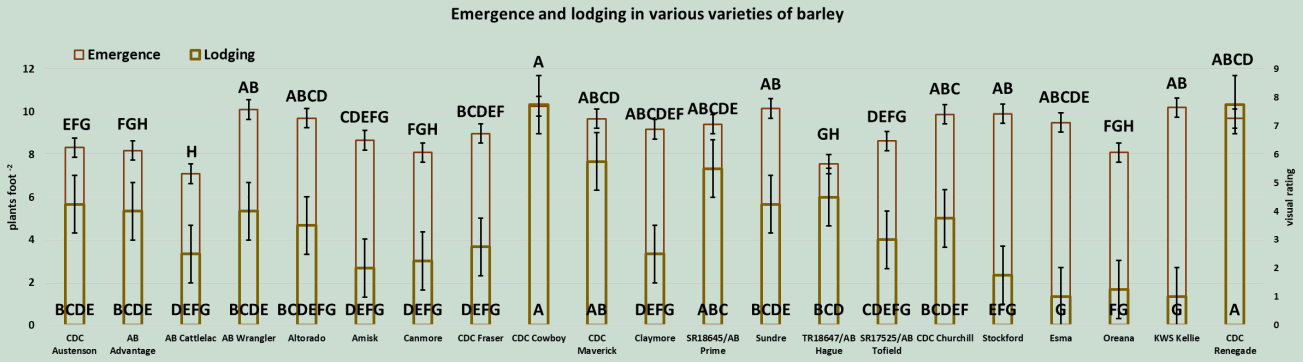
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Barley

Highlights

- 21 varieties grown
- Emergence was greater in CDC Cowboy and lowest in AB Cattlelac
- CDC Cowboy has shown to lodge more than other varieties such as Esma and KWS Kellie.
- CDC Cowboy yielded more compared to AB Hague and Stockford
- Claymore had more protein content compared to CDC Maverick and AB Prime and AB Advantage.
- CDC Cowboy had more ADF and NDF compared to Oreana and more protein than Stockford.
- CDC Fraser and CDC Maverick were low in K, P, and Mg compared to other varieties. Oreana and Stockford were low in K, Ca, Mg and Na.
- Mixture of either CDC Cowboy, Claymore or Esma with either AB Hague, CDC Churchill and Oreana could be beneficial for protein, macronutrient and energy intake with enough fibre for digestion

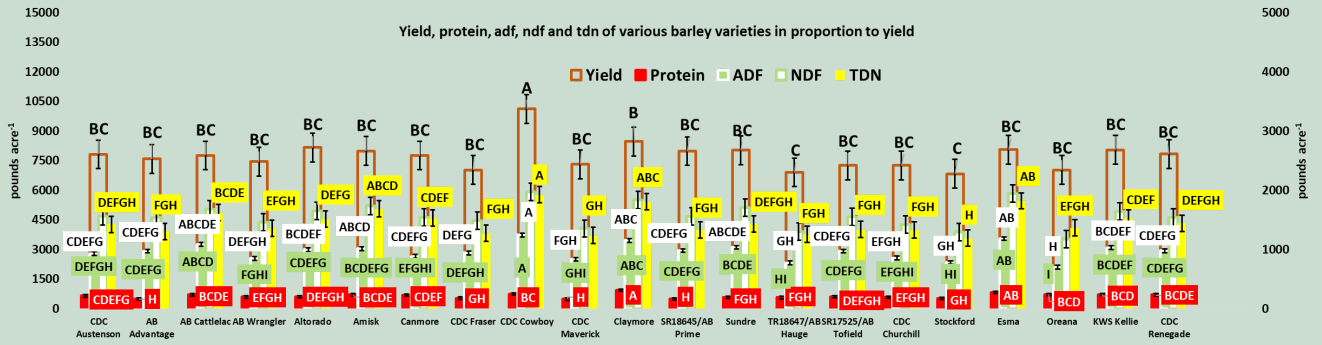
Emergence (P<0.0001) was greater in CDC Cowboy, with similar values in AB Wrangler, Altorado, CDC Maverick, AB Prime, Sundre, CDC Churchill, Stockford, Esma, and KWS Kellie.
Fresh weight values (P=0.1370) were the same across all varieties. Dry weight (P=0.00142) was heavier in CDC Cowboy forage stands compared to forage obtained from Amisk and Esma barley varieties. CDC Cowboy, CDC Renegade, CDC Maverick, AB Prime has shown to lodge more than other varieties (P<0.0001), especially more than Esma, KWS Kellie, Oreana, AB Cattlelac, Altorado, Amisk, Canmore, CDC Fraser, Claymore, AB Tofield and Stockford.



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Barley

CDC Cowboy was the most yielding variety compared TR18647/AB Hague and Stockford (P=0.0391). The other varieties were lower in yield than CDC Cowboy but no different than the least yielding or than Claymore. Protein content (P<0.0001) were the lowest in AB Prime, CDC Maverick, AB Advantage, AB Wrangler, Altorado, CDC Fraser, Sundre, AB Hague, AB Tofield, and CDC Churchill compared to Claymore and Esma. CDC Cowboy had the greatest values of ADF, NDF and TDN (P<0.0001) compared to Oreana for ADF and NDF and Stockford for TDN. Statistically similar values to CDC Cowboy were AB Cattlelac, Claymore, and Esma for ADF and TDF, and AB Cattlelac, Amisk, CDC Cowboy, Claymore, Sundre, as well as Esma for NDF. In comparison, ADF values like Oreana were AB Wrangler, CDC Maverick, AB Hague, CDC Churchill and Stockford. Same varieties also had similar NDF values in addition to the Canmore variety. Total digestible nutrient values like Stockford were CDC Austenson, AB Advantage, AB Wrangler, CDC Fraser, CDC Maverick, AB Prime, Sundre, AB Hague, AB Tofield, CDC Churchill, Oreana and CDC Renegade.

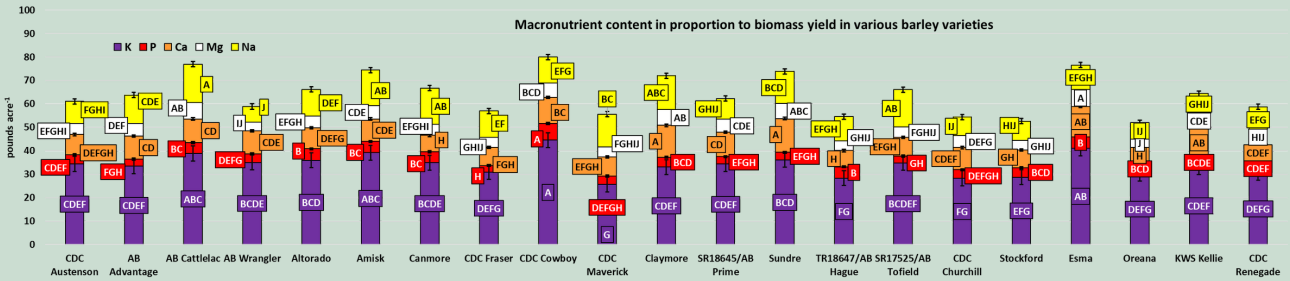




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Barley

Macronutrient content varied according to the barley variety used for forage (P<0.0001 for all values). The varieties with the number of macronutrients they had in dearth compared to others were: CDC Fraser and CDC Maverick. These two varieties showed poor K, P, Ca and Mg content. Compared to other varieties also, Stockford and Oreana were poor in K, Ca, and Mg content on top of showing low Na content. AB Hague and AB Tofield both had three macronutrients in scarcity compared to other varieties. Both were lacking Ca and Mg, but AB Hague lacked more K content whereas AB Tofield lacked more P content. AB Prime and CDC Churchill P and Na content were also among the lowest, AB Wrangler was lacking Mg and Na content and CDC Renegade had among the lowest values for K and Mg content compared to other varieties. Varieties with scarcity in a single macronutrient were CDC Austenson in Ca content, as well as AB Advantage and Sundre for P content.



Overall, there are two important barley variety groups to define here: first, CDC Cowboy can provide great yield and is a great source of digestible nutrients, as well as rich in K and P content. Claymore and Esma are the richest in protein and digestible nutrients as well as a major source of Ca and Mg despite being among the lowest yielding. The problem is that the ADF and NDF values in these three varieties are too high which may become feed that may take too long to be digested. Hence second, Varieties like AB Hague, CDC Churchill, Stockforn and Oreana might be more digestible for the animal to consume but their drawback is these varieties are poor sources of K, and Na. An alternative could be a mixture of varieties, one from each group, in order to ensure enough protein, TDN and macronutrients without adding too much fibre into the animals diet.



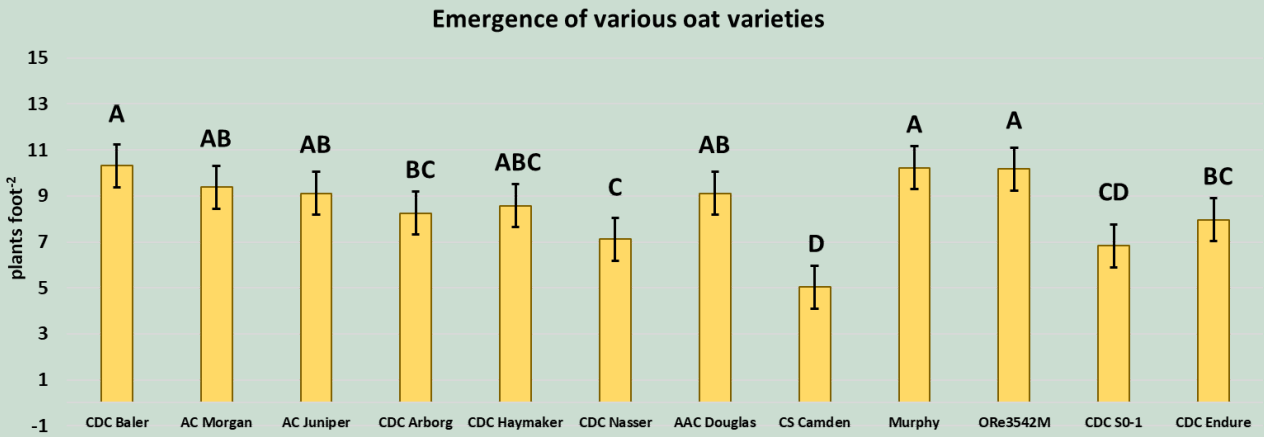
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Oat

Highlights

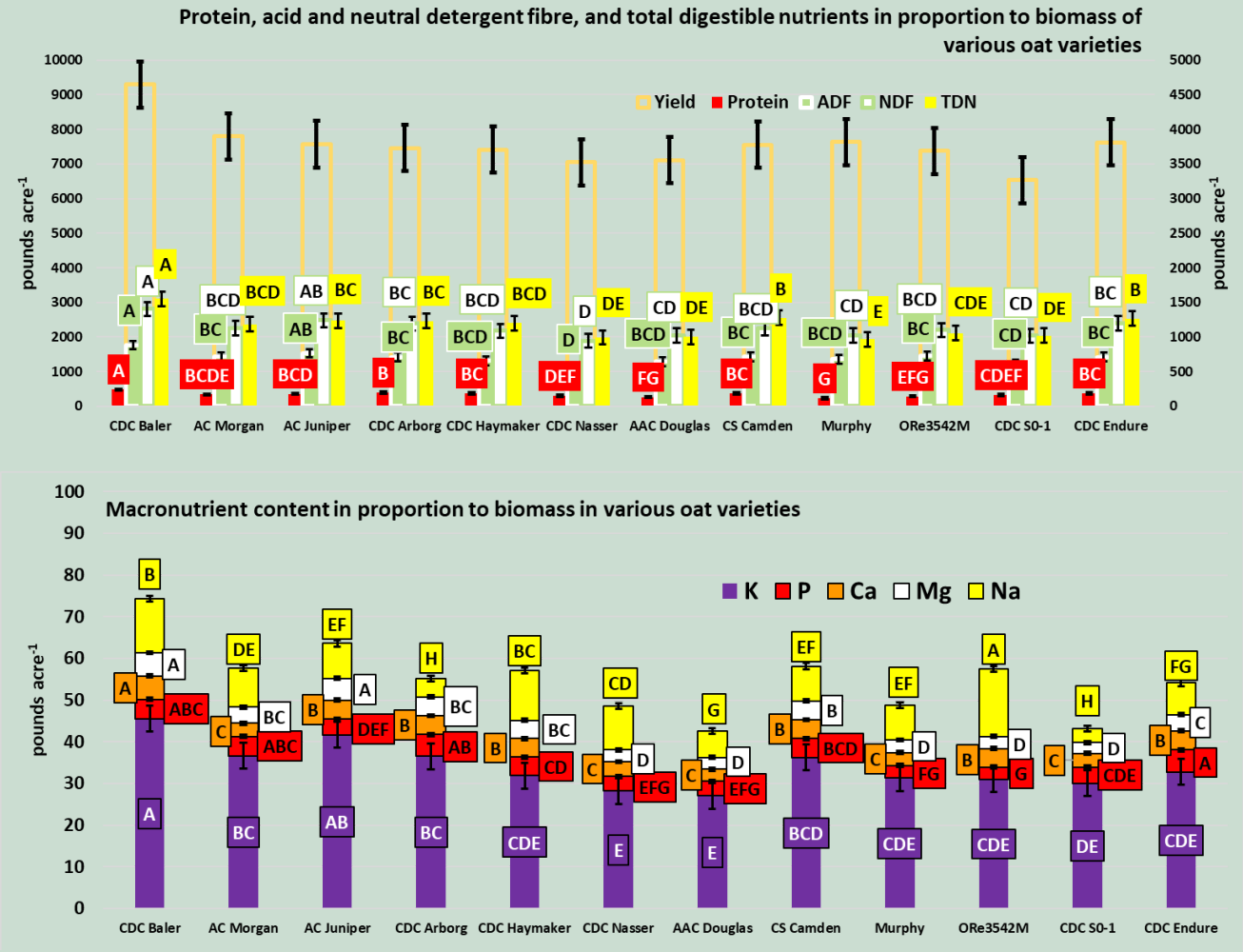
- 12 varieties grown
- Emergence in Murphy and ORe3542M was greater than CS Candem
- No difference in yield
- Greater protein, ADF, NDF and TDN content found in CDC Baler compared to
  - Murphy for protein and TDN
  - CDC Nasser for ADF and NDF
- K, Ca, and Mg was greater in CDC Baler whereas ORe3542M had greater Na content. These values were greater compared to
  - K content in CDC Nasser and AAC Douglas
  - P content inORe3542M
  - Ca content in AC Morgan, CDC, Nasser, AAC Douglas, Murphy and ORe3542M, CDC S0-1 and CDC Endure
  - Na content in CDC Arborg and CDC S0-1
- CDC Baler is a great source of protein, total digestible nutrients and macronutrients A possible mixture of CDC Baler with either CDC Nasser, CDC Haymaker, AAC Douglas, CS Candem, Murphy and CDC S0-1 may help to increase forage digestibility in cattle.

CDC Baler had more emergent individuals in comparison to CS Candem ($P<0.0001$). Yield as fed was the same in all varieties ($P=0.0568$). Protein ($P<0.0001$), ADF ($P=0.0033$) and NDF ($P<0.0074$) values in CDC Baler oat exceeded over values of the other varieties. AC Juniper ADF and NDF values were statistically the same as CDC Baler. In contrast, Murphy showed the lowest protein value among all varieties, and CDC Nasser had the lowest ADF, NDF and TDN values. Protein values like those found in Murphy were also found in AAC Douglas and Ore3542M. Acid and neutral detergent fibre as well as total digestible nutrients were similarly low in CDC Haymaker, AAC Douglas, CS, Camden, Murphy, and CDC S0-1. Ore3542M showed similarly low values but ADF.



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Oat



All macronutrients surveyed (K, P, Ca, Mg and Na) were significant among oat varieties ($P<0.0001$ for all values). Potassium content was greater in CDC Baler in comparison to CDC Nasser, AAC Douglas CDC S0-1 and CDC Endure varieties. Phosphorus content in CDC Endure, CDC Baler, AC Morgan and CDC Arborg surpassed the other varieties whereas CDC Nasser, AAC Douglas, Murphy and Ore3542M were the oat variety with least P content. CDC Baler and AC Juniper had the most Mg content than the other oat varieties as opposed to CDC Nasser, AAC Douglas, Murphy, Ore3542M and CDC S0-1. Ca content in CDC Baler exceeded that of Ac Morgan, CDC Nasser, Murphy, and CDC S0-1. Sodium content was low in CDC Arborg and CDC S0-1. Values show that CDC Baler is a great source of protein, total digestible nutrients and macronutrients but CDC Nasser, CDC Haymaker, AAC Douglas, CS Camden, Murphy and CDC S0-1 are more digestible. A possible mixture of CDC Baler with either of all these varieties may help to increase forage digestibility in cattle.

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Pulse and Cereal mixes

Highlights

- **Most emergence found in triticale with faba bean compared to triticale with forage pea**
- **Lodging most prominent in barley with forage pea and least in triticale with faba bean**
- **Greater fresh weight yield found in oat with faba bean compared to barley with faba bean**
- **Protein content in barley with yellow pea exceed that found in barley with faba bean**
- **ADF and NDF values in oat with faba bean exceeded that found in**
  - **Triticale with forage pea and triticale**
  - **Oat and forage pea (ADF only)**
- **Faba bean and oat mixes TDN values exceeded those found in triticale and yellow pea**
- **Faba bean and oat had more P and K**
- **Forage pea and had more Ca and Mg**
- **Pulse chosen as companion crop depends on the macronutrient that is most required by the animal.**
  - **yellow pea mixes can be great sources of Magnesium and Calcium,**
  - **faba beans are great contributors of potassium and forage peas can supplement Calcium requirements.**

Annual Forages - Pulse/Cereal Mixes	
Variety	**Seeding rate (lbs acre^{-1})**
CDC Austenson	144.5
CDC Baler	121.7
Taza	169.4
CDC Austenson + Aberdeen	72.2
CDC Austenson + **Aberdeen**	145.3
CDC Baler + Aberdeen	60.8
CDC Baler + **Aberdeen**	145.3
Taza + Aberdeen	84.7
Taza + **Aberdeen**	145.3
CDC Austenson + DL Tesoro	72.2
CDC Austenson + **DL Tesoro**	151.9
CDC Baler + DL Tesoro	60.8
CDC Baler + **DL Tesoro**	151.9
Taza + DL Tesoro	84.7
Taza + **DL Tesoro**	151.9
CDC Austenson + DL Delicious	72.2
CDC Austenson + **DL Delicious**	128.6
CDC Baler + DL Delicious	60.8
CDC Baler + **DL Delicious**	128.6
Taza + DL Delicious	84.7
Taza + **DL Delicious**	128.6

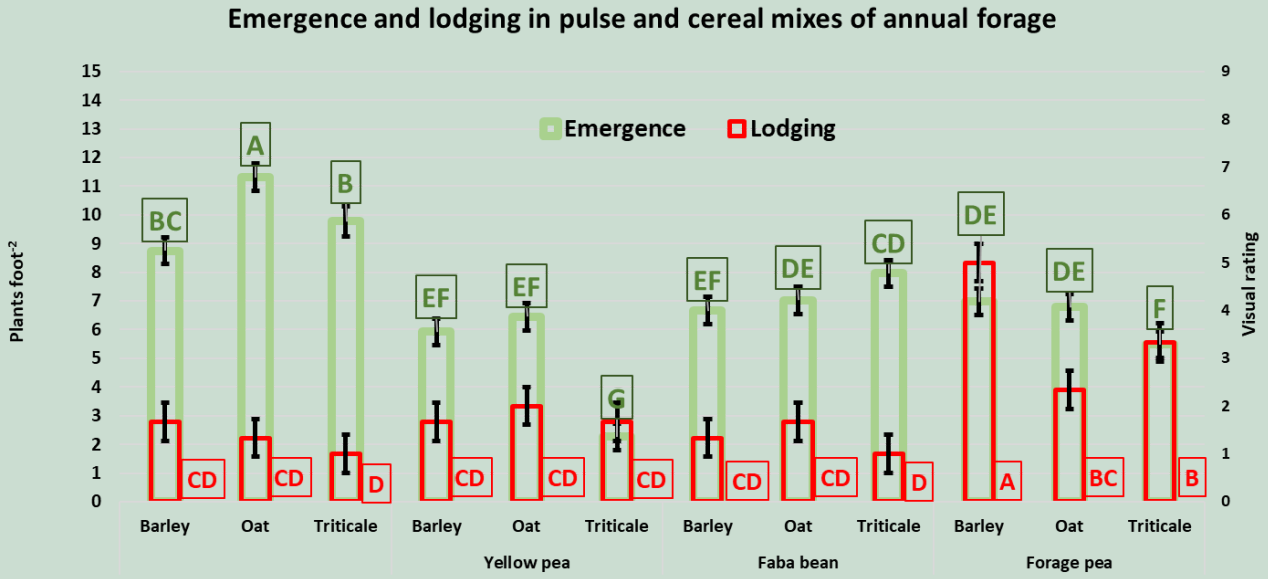
Across all treatments, greater number of emergent stands were found in plots sown as monocrops to cereals compared to mixes ($P<0.0001$). Barley as a monocrop produced 75% more emergent individuals per acre than intersown with yellow pea, faba bean, and forage pea combined ($P=0.0009$). Indeed, 32, 24 and 20% smaller number of individuals were found if barley was intersown with yellow pea, faba bean and forage pea respectively than sown alone.

Comparing emergence between oat and intercrops with yellow, forage pea and faba bean, mixes overall comprised 40% of the value of emergent seedlings found in oat as a monocrop. Oat intersown had 43, 38 and 40% less emergence in yellow, forage pea and faba bean respectively than as monocrop. A similar response was found in triticale, were emergent seedlings in all mixes comprised 41% compared to seedlings found in triticale monocrops. As such, pulse mixes with triticale had 77% less in yellow pea, 19% less in forage pea and 44% less in faba bean emergence than that of triticale monocrop plots ($P<0.0001$). Among pulses, number of emergent individuals in mixes of faba bean and forage pea surpassed those found in yellow pea by 19%; faba bean mixes showed 35% less ($P=0.003$) emergent stands compared to forage pea and yellow pea mixes.

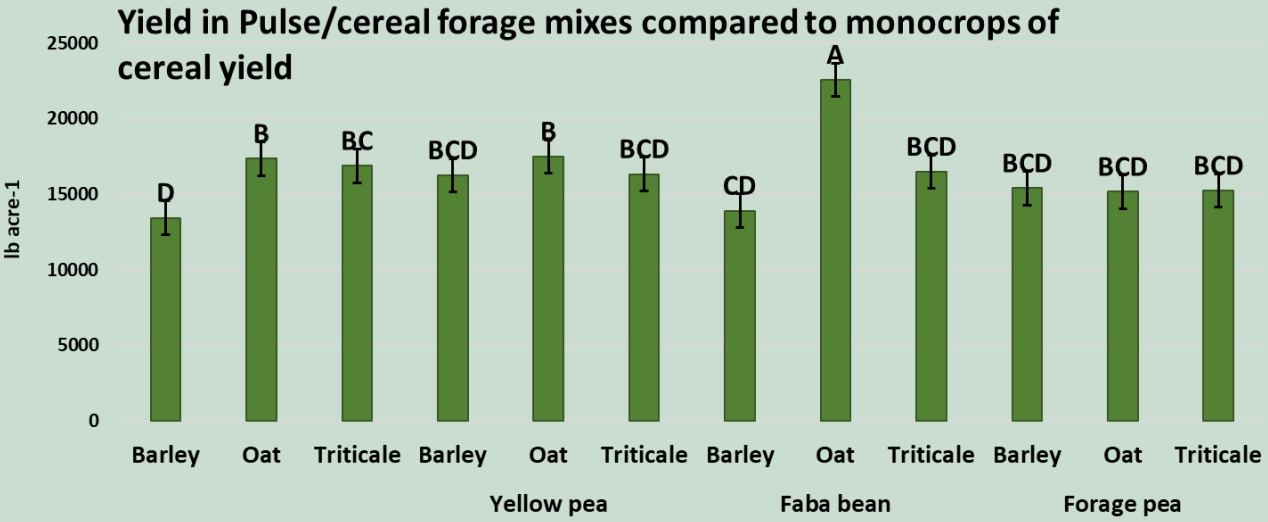
Lodging was found to be a greater problem in mixes of barley and forage pea. Indeed, the highest lodging rates were found in mixes containing forage pea, which may mean that this forage pea variety is very heavy for the cereal to withstand the effect of its vines. There was very little lodging in faba bean with triticale, which was as great as that found in triticale monocrop plots ($P=0.0001$).

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Pulse and Cereal mixes



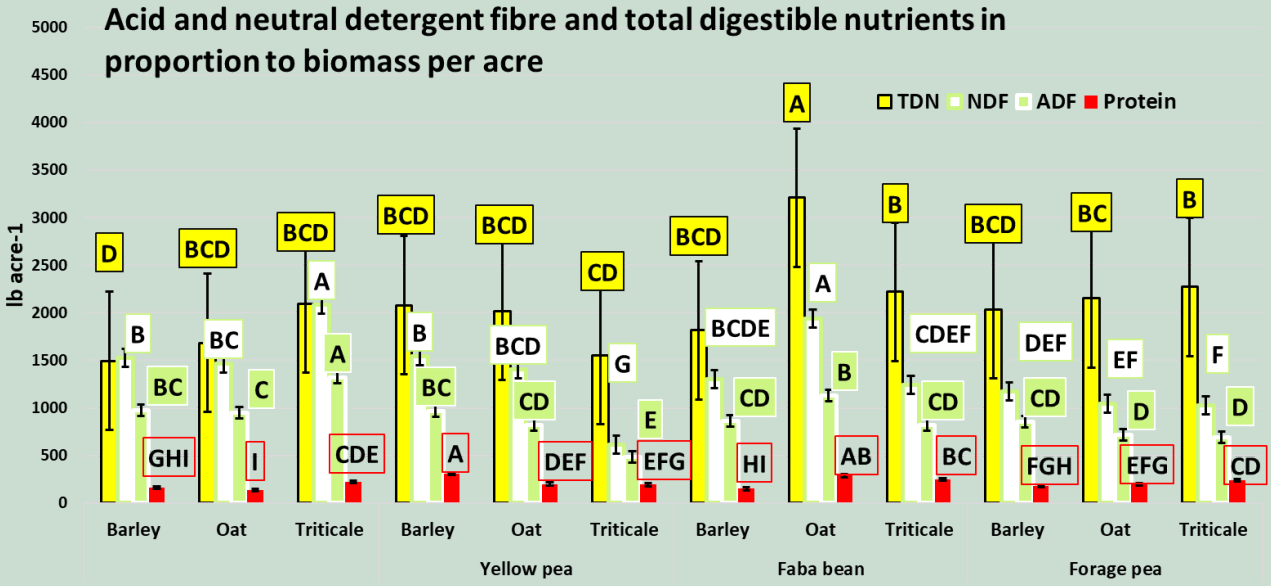
The most polarizing biomass values were found under the faba bean variety, faba bean (P=0.0004). Heavier biomass was obtained in mixes with oat whereas lighter yielding biomass was found in those stands mixed with barley. Indeed, mixes of faba bean surpassed in yielding biomass yellow pea and forage pea by 29%, whereas forage pea produced 36% less than average biomass yield of faba bean and yellow bean combined. This may be explained twofold. First, that faba bean stands are less competitive than yellow and forage pea stand which may have allowed more cereal stands to thrive. Second, the vine structures in pea plants may reduce cereal growth and induce more lodging, preventing sunlight and thus decrease cereal plant growth.



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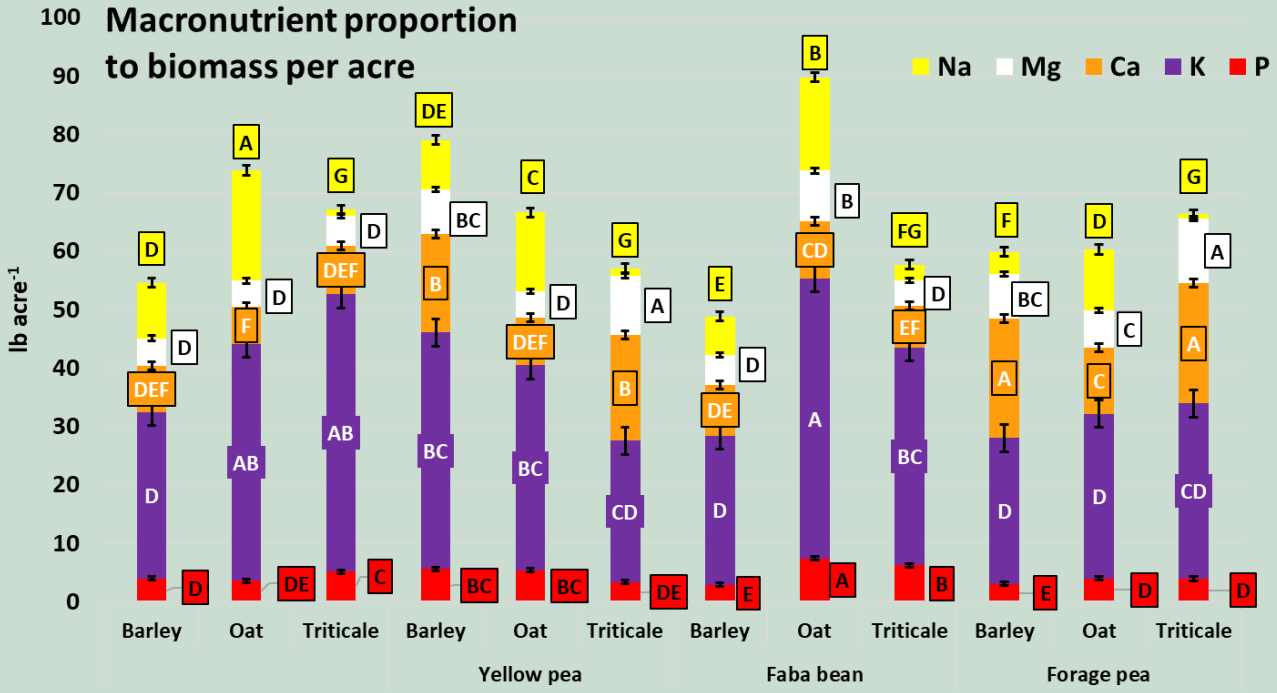
Pulse and Cereal mixes

Protein values were greater with yellow pea and barley mixes compared to mixes of barley and faba bean (P<0.0001). Barley and oat protein content was 24 (P=0.0021) and 40% (P<0.0001) less respectively as a monocrop than when intersowed with pulse mixes. Moreover, protein from mixes with forage pea was 35% less than protein found in yellow pea and faba bean mixes combined. Acid (P<0.0001) and neutral (P<0.0001) detergent fibre were the lowest in mixes of triticale and yellow pea whereas mixes of oat and faba bean had the highest values; triticale as a monocrop had 84% more ADF and 71% more NDF than triticale sown with any pulse variety and faba bean mixes had 86% more ADF and over 117% more NDF than mixes with yellow pea and forage pea (P=0.0016). Forage pea mixes in contrast had 96% less NDF than mixes with yellow pea and faba bean. Mixes of faba bean and oat had most total digestible nutrients compared to green pea and triticale mixes. In fact, oat had 17% less TDN grown as a monocrop rather than in an intercrop with a pulse. Faba bean mixes on the same note had 35% more digestible nutrients compared to yellow pea and forage pea mixes, and 48% less nutrients are found in forage pea mixes compared to those in faba bean and yellow pea mixes. Moreover, oat as a monocrop has 22% less digestible nutrients than when found as a companion crop to pulses. This shows that mixes of oat and yellow pea are more digestible. However, mixes with forage pea and either barley or triticale are an alternative as ADF and NDF values are just as low.



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Pulse and Cereal mixes



Macronutrient content was variable in cereal monocrop and pulse and cereal mixes ($P<0.0001$). Mixes of Faba bean and Oat had greater P and K percentage content compared to Faba bean and barley for P and barley monocrop, barley mixes with forage pea and faba bean as well as forage pea and oat for K. Forage pea and triticale content of calcium and magnesium was greater than that found in oat as a monocrop for Ca and triticale and faba bean mixes for Mg. Sodium content in oat was greater than that found in triticale and mixes of triticale. Barley monocrop Mg and Ca content was 30% and 49% less that found in barley with pulse mixes, contrary to Na content, which was 34% greater. Phosphorus, Calcium and Magnesium content in monocrop oat was 36, 35 and 31% less respectively in contrast to mixes. Triticale monocrop K content was 36% greater than K content found in triticale with pulses . However, Ca and Mg content in the same cereal was 46 and 39% less compared to that found in triticale mixes. Results indicate that animals, are shortchanged in macronutrient acquisition from cereal monocrops, unless they are needing some potassium in their diets, which can be provided with triticale forage. Otherwise, most of the macronutrients necessary for development and growth can be obtained in greater quantities through pulse and cereal mixes.

Even though, a pulse and cereal mix can significantly increase presence of macronutrients, the pulse species seeded as a companion also matter. Yellow pea mixes were high in Ca, surpassing contents of same macronutrients in mixes of forage pea and faba bean by 29%. Forage pea had 86% less P content, 63% less K, but more than a 100% Ca content than mixes of yellow pea and faba bean. Forage pea is scarce in sodium compared to yellow pea and faba as these latter pulses had a combined 114% more Na content. It shows that regardless of Na rich barley and oat additions, these are not enough to increase sodium levels. Faba bean mixes were high in Na, P, and K by 72, 69, and 63% compared to mixes of yellow pea and forage pea combined. Faba bean mixes, however, were deficient in Ca and Mg as combined values of forage pea and yellow pea mixes were much greater sources of Ca by 138% and Mg by 69%. In general terms, the pulse chosen as companion crop depends on the macronutrient that is most required by the animal. Thus, yellow pea mixes can be great sources of Magnesium and Calcium, faba beans are great contributors of potassium and forage peas can supplement Calcium requirements.

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Spring and winter cereal mixes

Highlights

- **Emergence was greater in spring triticale with winter triticale**
- **Lodging was less in barley with winter wheat**
- **Yield was greater in winter wheat with**
  - **Oat**
  - **Spring triticale**
- **Protein, NDF and TDN content was greater in mixes of winter triticale with spring triticale**
  - **TDN lowest values were found in barley with rye**
  - **NDF lowest values were found in barley mixed with**
    - **Rye**
    - **Winter triticale**
- **ADF content was greater in oat with winter wheat**
  - **Lowest content was found in barley mixed with rye**
- **K content was greater in winter wheat with spring triticale**
- **P content was greater in oat with winter wheat**
- **Ca, Mg and Na was greater in oat with rye**
- **Mixtures of oat with either winter wheat or rye are great choices to obtain the most out of K, P, Ca, Mg and Na and more digestibility. Rye can also be mixed with barley for more digestibility.**

Annual Forages - Winter/Spring Cereal Mixes	
Variety	Seeding rate (lbs acre^{-1})
Prima/CDC Austenson	27.3
Prima/**CDC Austenson**	72.2
Prima/CDC Baler	27.3
Prima/**CDC Baler**	60.8
Prima/Taza	27.3
Prima/**Taza**	84.7
AAC Wildfire/CDC Austenson	44.6
AAC Wildfire/**CDC Austenson**	72.2
AAC Wildfire/CDC Baler	44.6
AAC Wildfire/**CDC Baler**	60.8
AAC Wildfire/Taza	44.6
AAC Wildfire/**Taza**	84.7
Bobcat/CDC Austenson	56.4
Bobcat/**CDC Austenson**	72.2
Bobcat/CDC Baler	56.4
Bobcat/**CDC Baler**	60.8
Bobcat/Taza	56.4
Bobcat/**Taza**	84.7
CDC Baler	121.7
CDC Austenson	144.5
Taza	169.4

Number of individuals emerging was greater in monocrops of oat and spring triticale ($P<0.0001$). In fact, oat and spring triticale had 26 and 25% more emergent stands when sown alone than when intersown with rye, winter wheat and winter triticale.

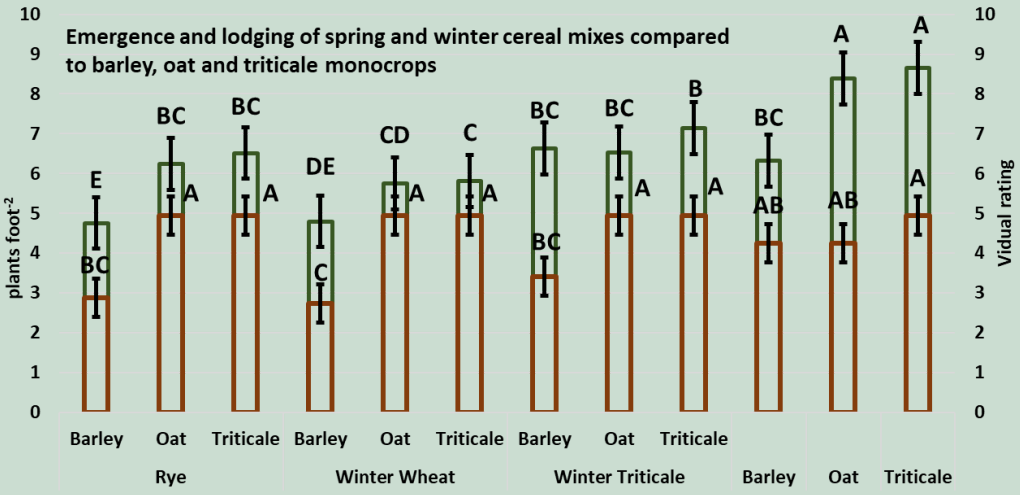
Fall rye and winter triticale mixes combined had 46% more emergent stands than winter wheat mixes ($P=0.0014$) and winter triticale mixes had 49% more individuals emerging in its mixes than rye and winter wheat mixes combined ($P<0.0001$). This shows that Bobcat has a greater number of emergent individuals. Although it may reduce emergence in other fast emergent varieties such as oat and spring triticale, it still can develop and appear soon and in significant numbers.

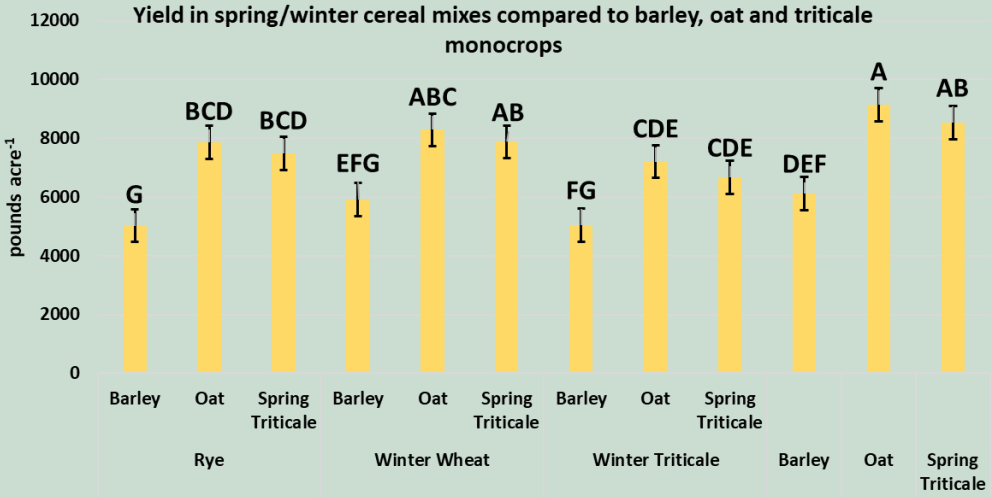
Lodging was a minor issue in most cereals and its mixes. However, mixes of oat with rye showed a higher visual rating compared to the other mixes and monocropped varieties ($P=0.018$). It is possible rye may have exerted some weight and cause some divergence in oat plant stands. As such, values are no different than visual ratings obtained from intersown combinations of barley and rye.

ANNUAL

Spring and winter cereal mixes

Yield was impacted by the companion cereals used to intersown either oat, barley or spring triticale. Oat and triticale were 15 and 14% more yielding as a monocrop than when combined into mixes with other cereals. Mixes of winter wheat with either oat or spring triticale were the highest yielding compared to mixes of barley with either rye or winter triticale ($P<0.0001$). In fact, winter wheat mixes were 33% more yielding than rye and winter triticale mixes and rye mixes had a yielding deficit of 32% compared to the other winter cereals. Even though yield was greater in oat and spring triticale as a monocrop, these cereals were great contributors in mixes as they constituted a great bulk of the yielding biomass resulted.

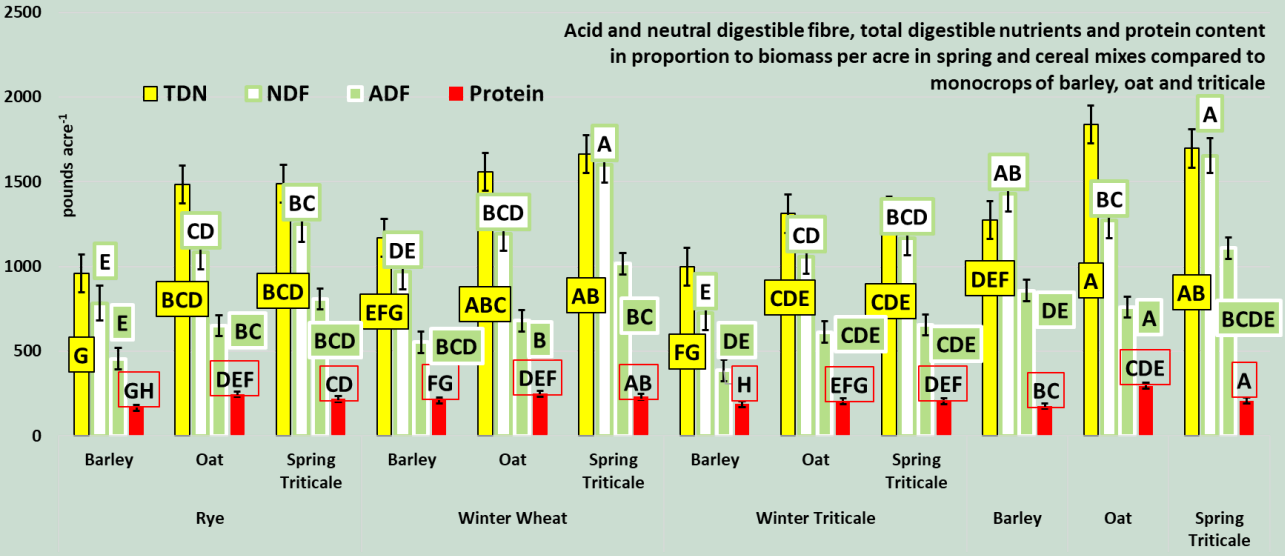




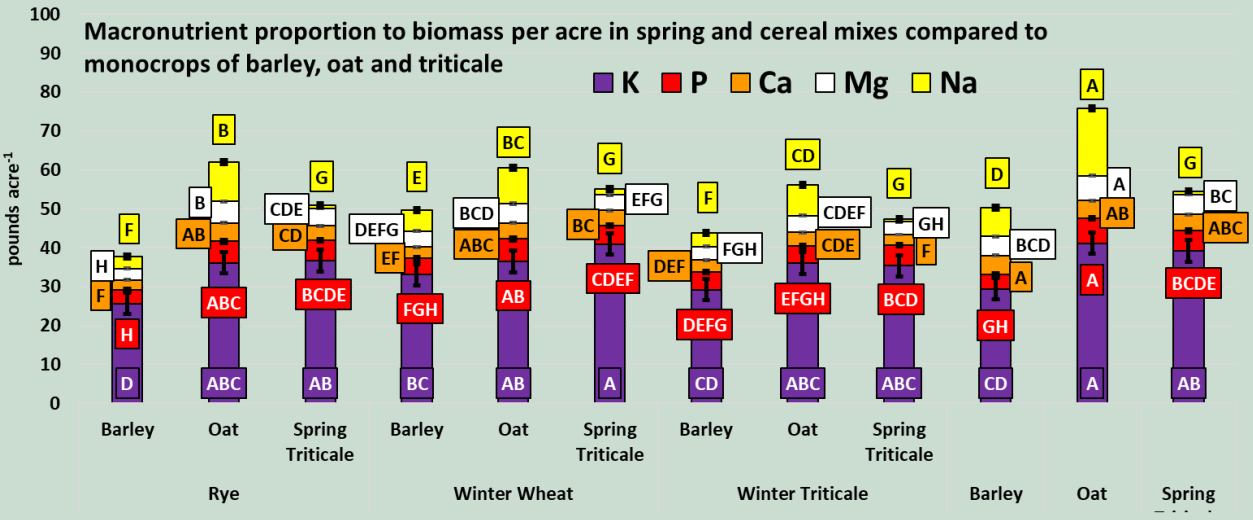
Protein, ADF, NDF and TDN varied according to the cereals and the cereal companions interseeded ($P<0.0001$ for all four parameters). Oat and winter wheat mixes had greater protein content than rye and barley mixes. Oat as a monocrop had 21% more protein content than that found in mixes containing oat. Moreover, mixes of winter wheat had 33% more protein than mixes where rye and winter triticale were used as a companion crop instead. It can be argued that a good protein source is winter wheat intersown with oat as both are great contributors. This decision is best as it provides protein for the animal and also increases diversity in the crop rotation dynamics.

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Spring and winter cereal mixes



Acid and neutral detergent fibre, as well as total digestible nutrients were lower in mixes of rye and barley as well as mixes of winter wheat and barley compared to the other mixes. Barley monocrops had 46% more ADF and 42% more NDF than mixtures where barley was present. On the same note, Spring triticale monocrops had 25 and 19% more ADF and NDF respectively compared to spring triticale mixes. Mixes of winter wheat surpassed rye and winter triticale ADF and NDF content by 62 and 58% respectively, whereas mixes of winter triticale had 62% and 42% less ADF and NDF content compared to mixes of rye and winter wheat. A similar result was found in TDN content in barley and spring triticale, where monocrops had more digestible nutrients (18% more in barley and 21% more in spring triticale). Mixes of winter wheat had 42% more nutrients than mixes of rye and winter triticale, and as such, winter triticale had 40% less TDN than that found in rye and winter wheat mixes. Barley with either rye or winter triticale mixes are the best choice for a more digestible diet compared to the other mixes, but not a great contributor of nutrients. A good alternative could be a mix of both spring and winter triticale as nutrient content in this mix is as high as that found in mixes of oat and winter wheat, whose value was among the statistically highest.



GOVERNMENT FUNDED TRIALS

Government Funded Trials - Seeding, Maintenance, and Harvest Information

Seeding			Maintenance						Harvest
			Fertilizer			Herbicide			
Date	Rate (plants per ft^2)	Depth (in)	Date	Product	Rate (lbs ac^{-1})	Date	Product	Rate (L ac^{-1})	Date
Assessing the allelopathic effects of cover crops on a crop rotation									
June 13	10*	0.5*	June 13	Urea	100	May 26	RoundUp (Glyphosate)	1	Oct 19 ¤
	8¥	0.75¥		S15	100	Sept 16	Reglone Ion (Diquat ion)	0.83	Oct 20 ¤¥
	30¤	0.75¤							Oct 21 *
Foliar nitrogen applications with fulvic acid									
June 3*	10*	0.5*	June 3*	See table		May 20¤	Heat LQ (Saflufenacil)¤	0.059¤	Sept 6¥
May 21¥	8¥	0.75¥	June 13¥			May 26*¥¤	RoundUp (Glyphosate)*¥¤	1*¥¤	Sept 28¤
May 24¤	30¤	0.75¤	May 24¤			June 12¥	Viper (Imazamox)¥	0.404¥	Oct 21*
						June 14¤	Esteem (Fluoxypyr, Clopryralid, MCPA)¤	0.24, 0.084, 0.281 ¤	
						June 15*	Odyssey (Imazamox & Imazethapyr)*	17 g/ac*	
						Aug 23¥	Reglone Ion (Diquat Ion)*¥	0.83*¥	
						Oct 7*			
New methods to manage fertility for crop rotations based on recommendations provided by the Haney soil test									
May 21¥	8¥	0.75¥	May 23*¤	Urea*¤	140*	May 26*¥¤	RoundUp (Glyphosate)*¥¤	1*¥¤	Sept 6¥
June 2*¤	10*	0.5*			120¤	May 31¥	Heat LQ (Saflufenacil)¥	0.059¥	Sept 30¤
	30¤	0.75¤	May 21¥	S15*¥¤	120¥	June 12¥	Viper (Imazamox)¥	0.404¥	Oct 6*
			June 2*¤		100*¤	June 14¤	Esteem (Fluoxypyr, Clopryralid, MCPA)¤	0.24, 0.084, 0.281 ¤	
						June 15*	Odyssey (Imazamox & Imazethapyr)*	17 g ac^{-1}*	
						Aug 23¥	Reglone Ion (Diquat Ion)*¥	0.83*¥	
						Sept 12*			
Weed suppression in field pea using intercropping after herbicide Group II application									
June 13	30	0.75	June 13	Urea	120	May 20	Heat LQ (Saflufenacil) & RoundUp (Glyphosate)	0.059 1	Not Harvested
				S15	100	Aug 9	Refine SG (Thifensulfuron & Triberunon)	12 g ac^{-2}	
Identify cover cropping strategies for the North Peace region to improve soil quality and promote adoption									
June 6	See table	0.75	June 5	Urea	100	May 26	RoundUp (Glyphosate)	1	Sept 12
			June 6	S15	100				
Identify intercropping strategies for the North Peace region to improve soil quality and promote adoption									
June 3	See table	0.75	June 3	Urea	100	May 26	RoundUp (Glyphosate)	1	Oct 17
				S15	100	June 24	MCPA Amine (Phenoxy-carboxylic acid)	0.17	Used on Trt 2, 4, 7
							Odyssey (Imazamox & Imazethapyr)	17 g ac^{-1}	Used on Trt 3
						Oct 7	Reglone Ion (Diquat Ion)	0.83	
Investigating practical solutions to improve soil temperature, water holding and drainage capacity in finer textured soils									
June 28	See table	0.75	June 28	Urea	100	June 5	RoundUp (Glyphosate)	1	Sept 13
				S15	100				

*Canola ¥Pea ¤Wheat



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Spring and winter cereal mixes

Macronutrient content was also influenced by cereal mix type. Potassium content was greater in mixes containing oat and spring triticale compared to those mixes containing barley ($P=0.0010$). Moreover, mixes containing winter wheat showed to have 30% more K than mixes with rye or winter triticale. Phosphorus was greater in mixes of oat, but it was lacking in mixes with barley and mixes of oat with winter triticale ($P<0.0001$). In general, oat monocrops had 19% more P than P found in mixes with oat as part of the intercrop mix. Richer calcium cereal mixes were those where oat was added but poor calcium content was found if barley was present and in mixes of spring and winter triticale ($P<0.0001$). As such, barley and spring triticale monocrops had 42 and 19% respectively more Ca than barley and spring triticale in mixes. Magnesium had greater content in mixes of oat with either rye or winter wheat and lowest in mixes of barley with either rye or winter triticale and in mixes of spring and winter triticale ($P<0.0001$). barley, oat, and spring triticale monocrops had 27, 23 and 23% more respectively of Mg than in intercrop mixes. Oat mixes with rye or winter wheat were richer in sodium compared to mixes of spring triticale with either winter cereal ($P<0.0001$). Barley and oat monocrops sodium content exceeded that of intercrop cereal mixes by 46 and 48% respectively. Winter wheat contributed to plenty of sodium content. Compared to rye and winter triticale mixes, winter wheat mixes were 73% richer. Winter triticale were poor contributors of Ca, Mg and Na. These mixes had 46% less Ca, 42% less Mg and 56% less Na contents than mixes with winter wheat and rye. Results showed that mixtures of oat with either winter wheat or rye are great choices to obtain the most out of K, P, Ca, Mg and Na, compared to rye and barley for most of them, except Na, whose mix with the lowest Na source is winter cereal intersown with spring triticale.



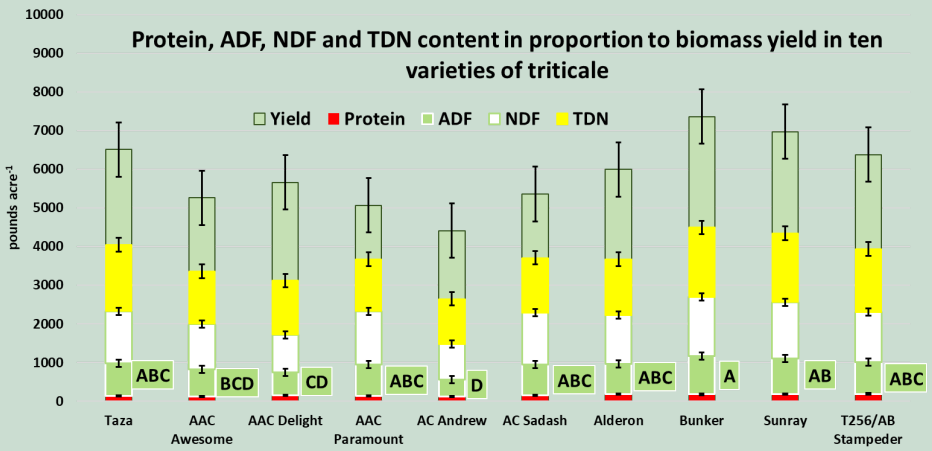
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Triticale

Highlights

- Ten varieties grown
- No difference among varieties
  - Emergence
  - Yield
  - Protein content
  - NDF
  - TDN
  - Potassium content
- Acid detergent fibre was greater in Bunker compared to AC Andrew
- P content was greater in Sunray compared to AAC Awesome
- Ca and Mgcontent was greater in Bunker, AB Stampeder compared to AC Andrew
- Na content was greater in AB Stampeder compared to Ac Andrew
- Triticale forage suitable for feed is possibly a mix of
  - Bunker or AB Stampeder
    - rich in most macronutrients
  - with either AAC Awesome, AAC Delight or AAC Andrew.
    - lower ADF values
    - may increase digestibility

Emergence (P=0.1647), yield (P=0.1373), protein (P=0.0687), NDF (P=0.1472) and TDN (P=0.2179) were the same among all varieties of triticale. Acid detergent fibre however was the lowest in AC Andrew as well as AAC Awesome and AAC Delight compared to the rest of the varieties whose ADF values were statistically just as high as the Bunker variety.



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Triticale

Macronutrients like P, Ca, Mg and Na varied according to triticale variety. Alderon was found to be rich in P, Ca and Mg. AB Stampeder was instead found to be exceeding in Ca, Mg and Na content compared to the other varieties. Bunker Ca and Mg content were as high as those found in Bunker and Sunray also had values as high as those found in the latter variety in P and Ca content. Triticale forage suitable for feed is possibly a mix of Bunker or AB Stampeder with either AAC Awesome, AAC Delight or AAC Andrew. The former varieties are rich in most macronutrients whereas the latter have a lower ADF values, which may increase digestibility.

