

Title Prediction of hardness and durability of alfalfa cubes processed from fractionated sun-cured and dehydrated alfalfa chops

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Abstract

Analysis of hardness and durability values of cubes manufactured from fractionated sun-cured and dehydrated alfalfa chops was performed to determine predictive equations. The initial moisture contents of dehydrated and sun-cured chops were 6% and 7% (wet basis), respectively. A forage particle separator was used to fractionate (separate) leaf and stem fractions. The leaf and stem fractions were combined to obtain five different samples each for sun-cured and dehydrated alfalfa with leaf content ranging from 0% to 100% in increments of 25% by mass. A single cubing unit having die dimensions of 30 mm by 30 mm in cross section and an effective depth of compression of 0.38 m was designed and constructed. A hydraulic cubing machine was used to apply compressive pressures of 9.0, 12.0 and 14.0 MPa on the sample chops. After compression, the plunger was held in place for 10 and 30 s, before the compacted forage was extracted. The lowest hardness and durability values for dehydrated and sun-cured cubes were obtained at leaf contents of 50% and 100%, respectively. Statistical analysis was conducted considering hardness and durability as dependent variables and pressures, holding time and leaf content as independent variables to determine best-fit regression equations.