

**THE INFLUENCE OF PROCESSING OF LUPINS AND CANOLA ON
APPARENT METABOLIZABLE ENERGY AND BROILER
PERFORMANCE.**

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Abstract

1. The influence of processing of *Lupinus angustifolius* and full-fat Canola seed on Apparent Metabolizable Energy and broiler performance.

The extrusion and dehulling of sweet blue lupins (*Lupinus angustifolius*, cultivar Wonga) and the expansion of full-fat canola seed were evaluated in terms of their effect on the nitrogen corrected apparent metabolizable energy (AMEn) value and broiler performance. Two separate trials were conducted for the lupin and canola test materials respectively. Four lupin products were tested and consisted of: lupin meal (LM), dehulled lupin meal (DLM), extruded lupin meal (ELM) and extruded dehulled lupin meal (EDLM). The two canola products were: canola full-fat (CFF) and expanded canola full-fat (ECFF). In each trial two summit diets were formulated with similar energy and crude protein values. The one did not contain any test material (control) and the other contained either lupin meal (170 g/kg for the starter test diet and 174 g/kg for the finisher test diet) or full-fat canola seed (169 g/kg for both the starter and finisher test diets). The other test diets were then prepared by replacing the LM with equal quantities of DLM, ELM and EDLM respectively and the CFF were replaced by ECFF. Each of these test diets were then blended with the control diet at six inclusion levels (0, 20, 40, 60, 80 and 100%) to produce experimental diets with increasing levels of the test material. These diets were fed to three groups of 80 as hatched Ross 308 broilers in the lupin trial and 40 in the case of the canola trial. Each trial lasted 42 days. Firstly, the influence of processing was measured in terms of its effect on the AME value of the test material and secondly on broiler performance. Body weight, feed intake and feed conversion ratio (g feed / g weight) were the parameters measured. The extrusion of lupin meal decreased AMEn from 8.61 MJ/kg to 7.52 MJ/kg. The ELM also resulted in inferior broiler performance in comparison with LM and DLM for all parameters measured. The combination of dehulling and extrusion (EDLM) did not result in significant improvements above that observed for ELM. The dehulling of lupin meal (DLM), however, increased the absolute value of lupin AMEn from 8.61 MJ/kg to 8.81 MJ/kg and this effect was also seen when ELM was compared to EDLM (7.52 MJ/kg to 8.04 MJ/kg). The expansion of full-fat canola (ECFF) increased the AMEn from 15.51 MJ/kg to 19.20 MJ/kg, but it did not significantly improve the body weight, feed intake or feed conversion ratio of broilers. Dietary levels above 10% CFF resulted in lower body weights and feed intakes were reduced in comparison to birds on the control diet from 6.8% CFF. The utilization of canola diets (FCR) were superior to those of the control from the 6.8% inclusion level of CFF.

Thus, the dehulling of lupins rendered a more nutrient dense product and this was reflected in the superior broiler performances observed with DLM in comparison with the other lupin products. If body weight is the main criteria, ground, raw canola seeds can be included in broiler diets up to 10%, but dietary levels of up to 16.9% will perform well in terms of feed conversion ratios.

Uittreksel

1. Die invloed van prosessering van Lupiene (*Lupinus angustifolius*) en Volvet Kanola op die Skynbare Metaboliseerbare Energie en braaikuiken prestasie.

Die invloed van ekstrusie en ontdopping van soet blou lupiene (*Lupinus angustifolius*, kultivar Wonga) en die ekspansie van volvet kanola saad is ge-evalueer in terme van hul effek op die stikstof gekorregeerde skynbare metaboliseerbare energie (SMEn) waarde asook braaikuikenprestasie. Twee aparte proewe is uitgevoer vir die lupiene en kanola toetsmateriaal afsonderlik. Vier lupien produkte is getoets naamlik: lupienmeel (LM), ontdopte lupienmeel (DLM), geëkstrueerde lupienmeel (ELM) en geëkstrueerde ontdopte lupienmeel (EDLM). Die twee kanola produkte is: volvet kanola saad (CFF) en geëkspandeerde volvet kanolasaad (ECFF). Vir elke proef is twee rantsoene met dieselfde energie en proteïen waardes geformuleer. Die een bevat geen toetsmateriaal nie (kontrole) en die ander een bevat óf lupiene (170 g/kg in die aanvangsrantsoen en 174 g/kg in die afrondingsfase) óf kanola saad (169g/kg vir beide die aanvangs- en afrondingsrantsoene). Die ander toetsrantsoene is voorberei deur die lupienmeel met gelyke hoeveelhede DLM, ELM of EDLM te vervang, terwyl die CFF met ECFF vervang is. Elk van hierdie toetsrantsoene is dan met die kontrole rantsoen vermeng in verskillende verhoudings (0, 20, 40, 60, 80 en 100%) om sodoende eksperimentele rantsoene te skep met toenemende vlakke van die toetsmateriaal. Die rantsoene is aan drie groepe van 80 Ross 308 braaikuikens gevoer tydens die lupien-proef en 40 in die geval van die kanola-proef. Die afsonderlike proewe is in 'n 42-dag siklus uitgevoer. Die invloed van prosessering van die toetsmateriaal is gemeet in terme van die verandering in SME, asook in braaikuikenprestasie. Liggaamsmassa, voerinnamings- en voeromsettingsverhouding (g voer / g massa) is gebruik as maatstawwe vir braaikuikenprestasie.

Die ekstrusie van lupienmeel het die SMEn van 8.61 MJ/kg tot 7.52 MJ/kg verlaag. In vergelyking met LM en DLM het die ELM ook 'n swakker liggaamsmassa en voeromset tot gevolg gehad. Die invloed van beide ontdopping en ekstrusie van lupiene (EDLM) het nie tot enige betekenisvolle verbetering gelei in vergelyking met dié van ELM nie. Die ontdopping van lupienmeel (DLM) aan die ander kant, het die absolute waarde van SMEn van lupiene van 8.61 MJ/kg tot 8.81 MJ/kg verhoog. Hierdie effek is ook waargeneem tydens die vergelyking van ELM met EDLM (7.52 MJ/kg tot 8.04 MJ/kg).

Die ekspandering van volvet kanola het die SMEn van 15.51 MJ/kg tot 19.20 MJ/kg verhoog, maar dit het nie die liggaamsmassa, voerinname of voeromsettings verhouding (VOV) van braaikuikens betekenisvol verbeter nie. Insluitingsvlakke bo 10% CFF het 'n laer liggaamsmassa tot gevolg gehad, terwyl voerinnames noemenswaardig verlaag het in vergelyking met die braaikuikens op die kontrole dieet vanaf 6.8% CFF. Die benutting van kanola rantsoene (VOV) was egter beter as dié van die kontrole vanaf die 6.8% insluitingspeil van CFF.

Die ontdopping van lupiene het dus 'n meer nutriënt-digte produk daargestel en is weerspieël in die beter braaikuikenprestasie wat waargeneem is met DLM in vergelyking met die ander lupien produkte. Indien liggaamsmassa as die hoof kriteria beskou word, kan rou, gemaalde kanolasaad by braaikuikenrantsoene ingesluit word tot en met 10%, maar insluitingspeile van tot 16.9% sal goed presteer in terme van voeromsettings verhoudings