under 4°C over 24 hours. After storage of 24 hours carcasses were weighted again to obtain cold carcass weight (CCW) and to calculate lost by refrigeration. True yield was obtained by a relationship between HCW and shrunk weight at slaughter. Data were submitted to variance analysis and averages were compared by Tukey test at 5% of probability.

Results

There was no effect from types of high moisture corn grain ($P > 0.05$) over studied variables parameters. Lost of weight by refrigeration (LWR) showed an average of 2.8%, values considered normal (3.0 – 4.0%) by Sañudo & Sierra (1986). The results of this study show that high moisture corn grain silage with inclusion of soybean or sunflower seeds, or urea can be the main concentrate in lamb diets and performance is not affected. Table 1

Conclusions

The use of high moisture corn silage with inclusion of soybean seeds, sunflower seeds or urea as a concentrate to replace commercial concentrates in diets of lambs fed in feedlots is viable.

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Analysis of the mineral content of clays used for clarification in the oil industry and their possible incorporation in animal feeding programs

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Introduction

The acid-activation of bentonite by hydrochloric acid produces a bleached earth marked as "Tonsil". They are used in agriculture, building industry, ceramics, chemical industry, paints and varnish industry, purification and stabilization of vegetable oils, among others. In Mérida, Yuc., México, the oil industry uses four types of such clays to clarify cooking oils: Supreme (126 FF), Supreme (1200 FF), Actisil (220 FF) y Optimum (320 FF), (Sud Chimie, 2004). After being used by the industry, disposal of clays may become a problem of environmental pollution. An alternative use of these materials is, as mineral supplement in animal feeding programs. Therefore, the objective of this study was to assess the feasibility of using the wasted clays as mineral source for farm animals.

Material and methods

A study was carried out comparing the mineral content indicated on the label of the four types of clays used in the oil industry, with the tolerance levels of domestic animals (NAP, 2005), with emphasis on possible toxicity. Calculations also considered the tolerance levels of humans to heavy metals, since man is the final link in the food chain (Concon, 1988).

Results

Mineral content of clays as shown in their label, is found in Table 1, where animal tolerance level is also mentioned. The most valuable minerals for animal feeding purposes are Mg, K, Fe, Ca, Zn, Cu, Mn and Cr. Si is considered inert for animals, therefore even though its quantity in clays is very high, it doesn't seem to be risky to animal health, but special attention should be taken to avoid possible toxicity. Content of Al is also very high. As far as Pb, Hg and Sr, they can be dangerous since they are bioaccumulated both in animals and humans, however, their amount in clays is low and therefore they do not represent a potential hazard. Ni and As are also in low quantities. Cd level in clays, in most cases, is greater than the level of tolerance of the animals and it may be bioaccumulated, but is important to consider that tolerance level of humans is high (Alessio *et al.*, 1983). Therefore Cd content of clays can be considered safe in the food chain, since humans

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Table 1 *Mineral content of clays as shown in their labels compared with animal tolerance level (ppm)**

	Mg %	Na %	Fe %	K %	Ca %	Si %	Al %	Zn ppm	Cu ppm	Mn ppm	Cr ppm	Ni ppm	As ppm	Pb ppm	Cd ppm	Hg ppm	Sr ppm
126 FF	2.0	0.5	2.9	2.2	0.9	31.1	*6.7*	64	15	168	39	5	3	6	*0.4*	<.1	165
1200 FF	2.5	0.1	1.1	0.3	1.3	31.7	*7.1*	37	8	120	8	2	6	25	*4.0*	<.1	394
220 FF	3.0	0.7	2.7	2.6	1.5	29.5	*7.1*	67	18	422	52	14	4	6	*0.6*	<.1	355
320 FF	2.9	0.8	2.9	2.6	1.3	29.3	*7.3*	68	15	346	51	14	3	6	*0.6*	0.1	420
Animal tolerance level*						2000	*1000 All*	300 O	25 O	500 O,H,R	1000 All	50 O,B, H, R	50 All	30 All	*0.5 All*	2 All	2000 O, H, R
Recommendation**	S	S	S	S	S	S	*NS*	S	S	S	S	S	S	S	*NS*	S	S

*Maximum tolerable level by the animal species most sensible to such mineral (ppm). O = ovines, B = bovines, H = horses, R = rabbits.
**S = safe, NS = not safe.

have an innate resistance to it. When clays have already been used by the industry, mineral content is reduced, due to the presence of 25% of residual oil. These disposable clays are the byproduct that could be considered for animals feeding purposes. As mentioned previously, the limiting factor for their use, is mostly the high Al content. Therefore restricted consumption by animal species should be estimated, to avoid bioaccumulation. If Al accounts for 5.3% in wasted clays as an average, maximum intake of clays depending on animal tolerance is (g anim^{-1} d^{-1}): 151 in bovines, 19 in sheep, 7 in swine, 0.38 in poultry, 15.1 in horses and 2.3 in rabbits.

Conclusions

The biggest benefit of the use of disposable clays as a feedstuff resides in their amount of Fe and to a lesser extent K, Mg, as well as residual oil. Its high Al content represents the main constraint to their employment. Due to their greater consumption and tolerance to Al, target species to be feed with disposable clays are ruminants, offering bovines no more that 150 g anim^{-1} d^{-1}. This use may help to reduce environmental pollution.

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Effect of dietary plant charcoal from Canarium schweinfurthii Engl. and maize cob on aflatoxin B1 toxicosis in broiler chickens

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Aim

A study was conducted to evaluate the effect of including plant charcoal from Canarium schweinfurthii (charcoal A) and maize cob (charcoal B) in the diet on aflatoxin B1 toxicosis in broiler chickens.

Materials and Methods

Three-weeks-old male chicks (Hybro) were randomly divided into 8 groups of 20 individual birds each individually caged in a completely randomised design. The birds in group 1 received diet C- without aflatoxin B1 and considered as negative control, while the chickens in group 2 were fed with diet C+ (positive control) containing 22.02 ppb of aflatoxin B1 produced in peanut meal by Aspergillus flavus. The chickens in groups 3 to 8 were fed diets containing 22.02 ppb of aflatoxin B1 and supplemented with either 0.20, 0.40, or 0.60% of charcoal A (A0.20, A0.40 and A0.60 respectively) or charcoal B (B0.20, B0.40, and B0.60 respectively).

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