



## Maize Gluten Meal Used as A Feed for Animal Production

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<https://doi.org/10.5281/zenodo.7422196>

### Abstract

Maize gluten meal is the concentrated and dried maize protein obtained after the final separation from starch. The gluten/gluten meal is a rich protein source and also contains carotenoids. Maize gluten meal (MGM) (corn protein) is a significant maize wet milling by-product containing at least 60 % protein and is rich in health-promoting carotenoids. Maize gluten meal is the main feed for poultry and fish to achieve better pigmentation of egg and flesh.

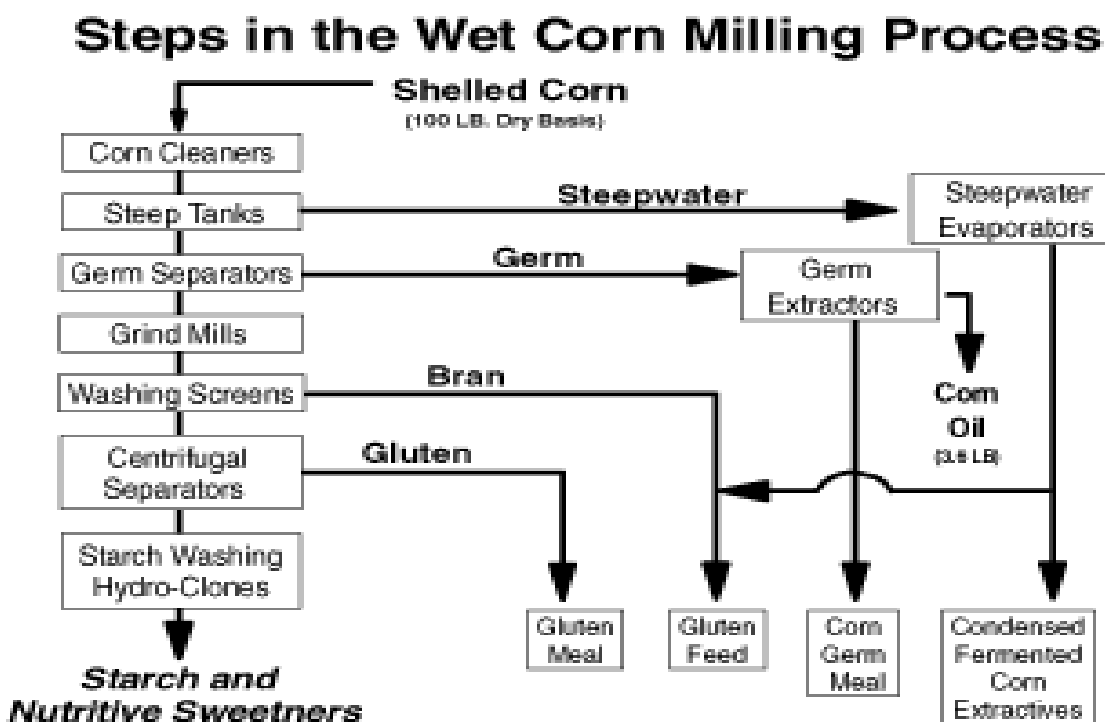
### Introduction

Maize (*Zea mays* L.), which belongs to the family *Gramineae* and genus *Zea*, is a staple food in many places worldwide and the third most important crop after rice and wheat. World maize production is currently 1136 million metric tons (MMT) and in India, it is 30.2 MMT. About 20 % of the maize produced in India is used for food purposes, about 47 % for poultry feed, 13 % for livestock feed, 14 % in the wet milling industry to obtain starch and 6 % for export and industrial non-food products. The maize is mainly processed into food using dry and wet milling procedures.

Maize gluten feed is a combination of the hulls and fiber fraction with steep water, maize germ meal and other process residuals. Maize gluten meal is the concentrated and dried maize protein obtained after the final separation from starch. The gluten/gluten meal is a rich protein source and also contains carotenoids. Maize gluten meal is the main feed for poultry and fish to achieve better pigmentation of egg and flesh. The maize fiber is recombined with steep liquor and used as poultry feed. The maize germ meal, maize fiber and steep soluble are recombined to produce the co-product called maize gluten feed used as animal feed.

## Maize Wet Milling

Accepted lots of maize grain are thoroughly cleaned by screening and aspiration. Cleanings are added to the co product feed. The clean maize is then steeped for 30 to 35 hours at 47 to 35o C to soften it for the initial milling step. During sub-sequent wet-milling processes, the maize germ is separated from the kernel and processed to remove the oil. After the germ has been removed, the remaining portion of the kernel, which contains the bran (exterior portion or hull of the kernel), gluten and starch, is screened and the bran removed. The bran (fiber portion) is then mixed with steep liquor and sold as wet maize gluten feed (WCGF) or with water removed, as dry maize gluten feed (DCGF). The ratio of bran to steep liquor is generally 2/3 to 1/3. When dried and further processed into a kernel or pellet, approximately 12-13 pounds of DCGF is produced per bushel of maize. The germ is marketed for its oil and the starch is further processed into fructose syrup.



Overview of wet maize milling process

## Composition Of Maize Gluten Meal

Maize gluten meal (MGM) (corn protein) is a significant maize wet milling by-product containing at least 60 % protein and is rich in health-promoting carotenoids. Maize contains albumins, globulins, prolamins (zein protein) and glutelin proteins (35 %), with zein protein contributing more than 50 %. A

mixture of zein protein and glutelin's, known industrially as maize gluten, are endosperm-specific. MGM contains adequate quantities of sulfur-containing amino acids, methionine and cysteine, involved in synthesizing intracellular antioxidants. The hydrophobic amino acid composition containing leucine, alanine and phenylalanine makes MGM proteins a good source of bioactive peptides. However, due to its imbalanced amino acid composition and low water solubility proteins, MGM is mainly marketed as a feedstock. The MGM contained around 195–491 mg/kg xanthophylls (lutein, zeaxanthin and cryptoxanthin), whereas the feed maize kernels had only 40.1 mg/kg xanthophylls.

### **Nutrient intake and apparent digestibility of wet maize gluten meal**

Staples *et al.*, (1984) studied the nutrient intake and apparent digestibility of wet corn gluten meal and reported a linear decrease in DM intake with increasing levels of wet CGF fed to cows, and Milton *et al.*, (2000) reported decreased DM intakes for steers consuming wet or rehydrated corn bran as opposed to dry corn bran. However, Green *et al.*, (1987) who fed finishing steers a diet containing 10% roughage and replaced 23 or 46% of dry-rolled corn with wet or dry CGF found a tendency for increased DM intakes by steers fed both wet CGF treatments. The 23 and 46 % levels of wet CGF increased average daily gains by 7.0 and 12% respectively, compared to dry CGF.

### **Conclusion**

Wet milling of maize yields 60–70 % starch with more than 30 % by-products (maize germ, gluten and fibre). Maize fibre is rich in phytosterols and dietary fibre, whereas maize gluten (protein) is rich in carotenoids and proteins. The maize gluten meal used as feed for animal feeding for improving animal health and production.

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