

History of Almond Hull Legislation

Brief Overview of the California 15% Fiber Rule

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1) Fiber Fraction Determination

- What is Fiber?
- How is Fiber measured for livestock feed?
- What are the differences between measurement techniques?

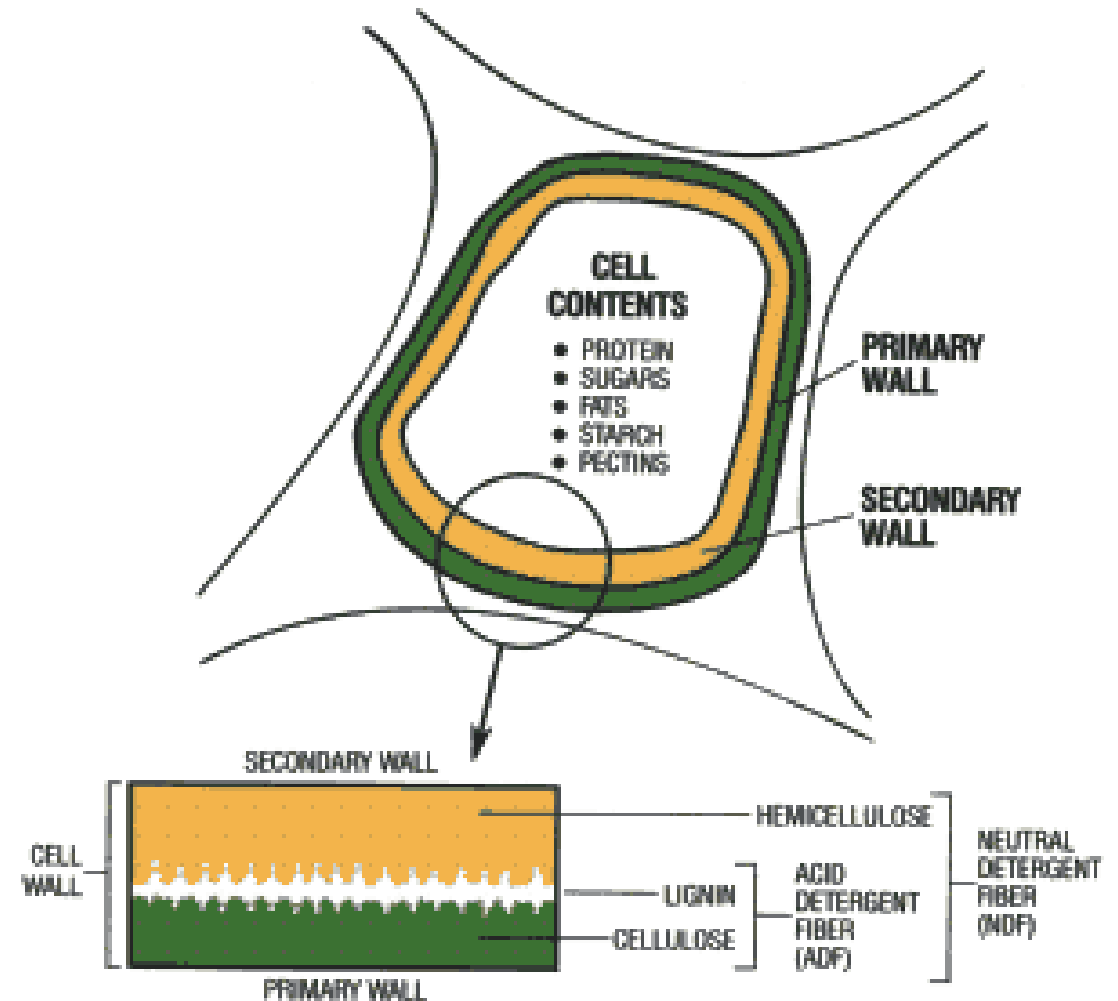
2) Almond Hull Research

-Past research and establishment of 15% CF Law

What is Fiber?

Plant Structural Carbohydrates

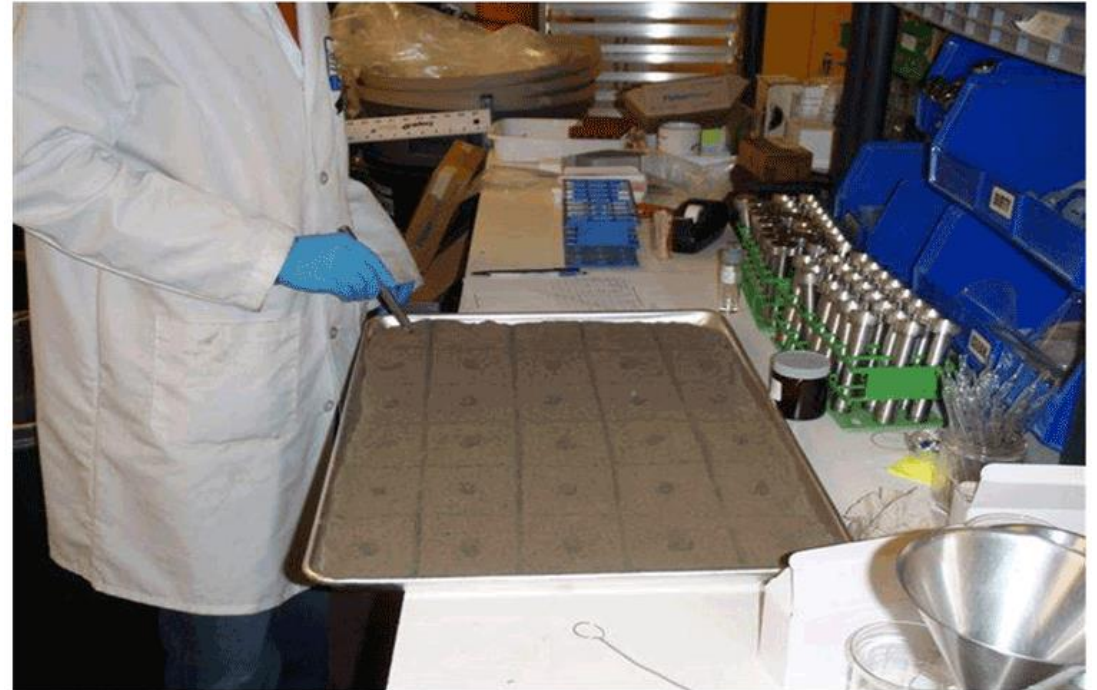
- Main structural components of plant cell wall are cellulose and hemicellulose
 - Hemicellulose is the most digestible fiber component
- Lignin is inserted between the two layers as the plants mature
 - Lignin is indigestible
- Forages contain a large percentage of cell wall concentrates
- Fiber fraction can impact feed intake and animal performance



Feedstuff → Laboratory Values

Sampling Techniques

- In field Subsampling
- Laboratory Subsampling
 - Samples are ground
 - Subsample Taken of ground lab products using statistically validated measures



How is Fiber Measured?

- Proximate Analysis

- **Crude Fiber (CF)**

- Mostly Cellulose

- Lignin amounts vary

- Van Soest Method

- **Neutral Detergent Fiber (NDF)**

- Hemicellulose

- Cellulose

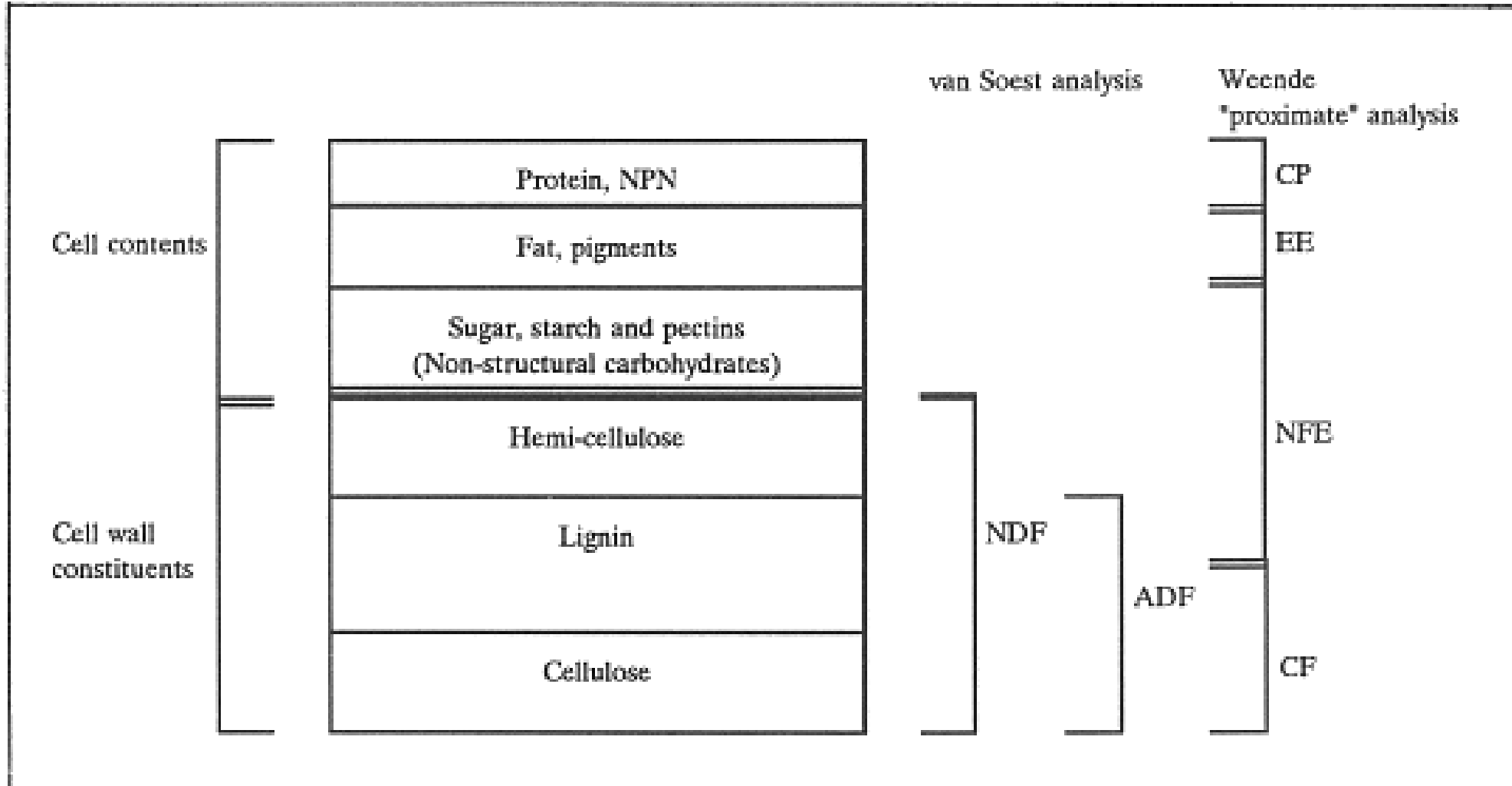
- Lignin

- **Acid Detergent Fiber (ADF)**

- Cellulose

- Lignin

What are the differences between measurement techniques?



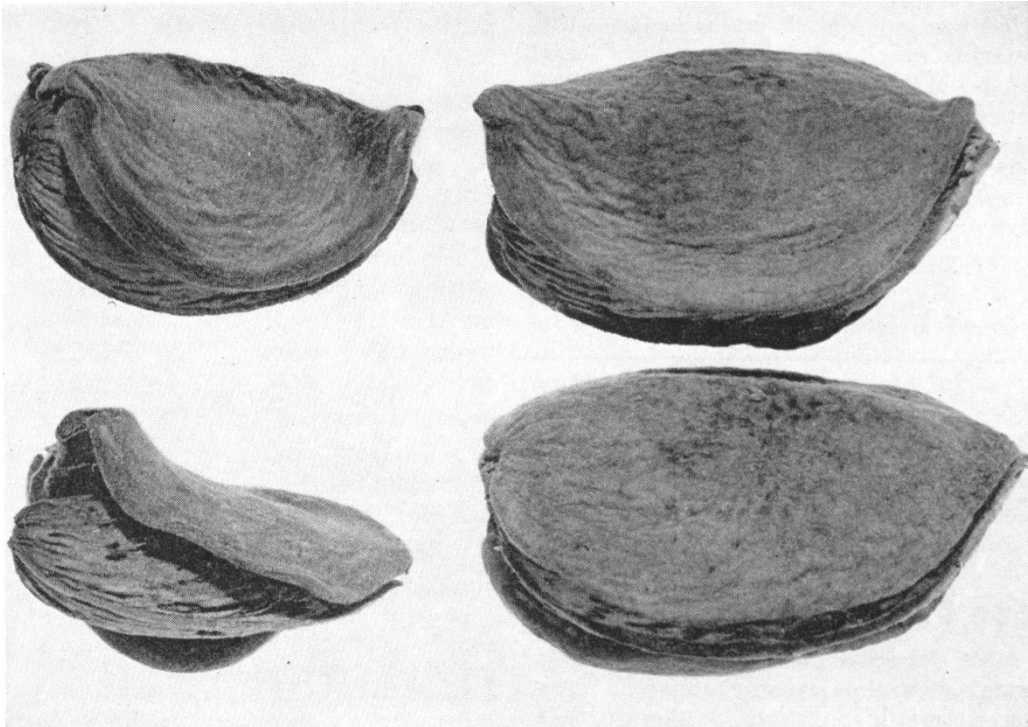
History of Almond Hulls

- Almond Hulls as Feed (1951)

- Lambs as ruminant models
- 10-17% CF Almond Hulls
- 50-60% NFE
- TDN higher for IXL vs. Mission Hulls
 - Noted a "considerable difference in feed value among almond hulls"

- Change in Almond Processing Created new By-Products

- Rough Hulling vs. Shelling
 - Hulls alone or hulls and shells removed together

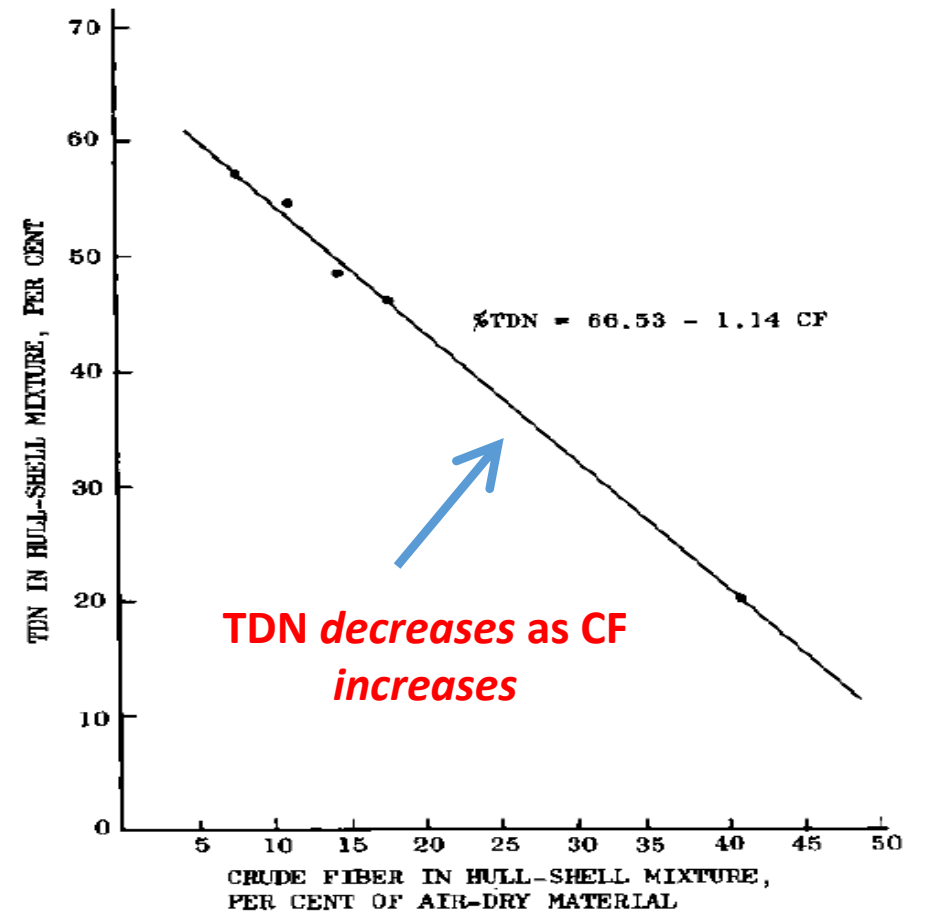


Hulls covering almonds before removed by a special machine

History of the 15% CF Rule

- Digestibility feeding trial (1965)
 - Value of Almond Hulls as a feed *decreases* as crude fiber *increases*
 - Roughly 1:1 decrease
- Average **Almond Hull and Shell** Value range established
 - 18.6% -30.8% CF depending upon variety
- 1976 Amendment Filed to Define Almond Hulls in CA Law

GRAPH 1. REGRESSION OF TOTAL DIGESTIBLE NUTRIENTS CONTENT OF ALMOND-HULL-SHELL MEAL ON ITS CRUDE FIBER CONCENTRATION.



Data adapted from Valasco, M., C. Schoner, Jr., and G.P. Lofgreen, "Composition and Feeding Value of Almond Hulls and Hull-Shellmeal," California Agriculture, Vol. 19, No. 3, 1965

• 1984 CDFA Proposed Invert Sugar Amendment

- Citing Almond Hull Value as a source of energy due to sugar content as expressed in Total Sugars as Invert (TSI)
- Amendment would establish an 18% minimum TSI for Almond Hulls based on 1983 research by UC Davis to analyze quality of **rain affected feed***
 - Almond Hulls Energy Value decreased with increase in rain (up to 25% decrease)
- **Regulation not adopted**
 - Mixed opinions from industries involved at amendment hearing
 - ADF?
 - CDFA's Hearing Officer stated that evidence of TSI was "at best, mixed as to whether the sugar content of almond hulls is a fair and reasonable measure of the feed value of the hulls"

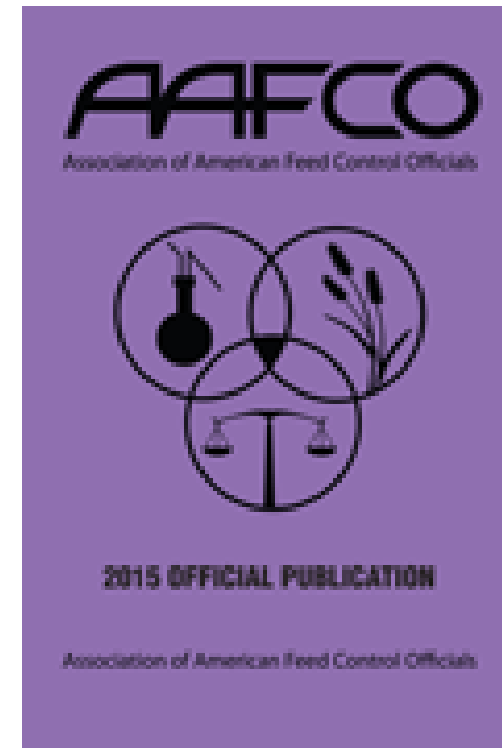
Association of American Feed Control Officials (AAFCO) Current Almond Hull Definition

Adopted 1985

- Crude Fiber- 15%
- Moisture- 13%
- Ash- 9%
- **TSI- 18%**

Almond Hull with Almond Shell

- Crude Fiber- 15 - < 29%



Where are we today?

- 1984 Amendments to 2773.5 were not adopted and CF % continues to be the industry quality standard for Almond Hulls
- New research to look at alternative methods of standardizing almond hull and almond hull and shell quality standards