United States Department of Agriculture

Agricultural Marketing Service

Fruit and Vegetable Programs

Processed Products Branch

Grading Manual for Frozen Lima Beans

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PREFACE

These instructions are designed primarily for Processed Fruit and Vegetable Inspectors of the U.S. Department of Agriculture. They are not intended to be a comprehensive treatise on the subject but give background information and guidelines to assist in the uniform application and interpretation of USDA grade standards and other similar specifications.

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INSPECTORS INSTRUCTIONS

FROZEN LIMA BEANS
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INSPECTORS' INSTRUCTIONS FOR FROZEN LIMA BEANS

I. PRODUCT DESCRIPTION

The U.S. standards cover only the product prepared from "succulent seed" of the lima bean plant. Soaked lima beans are not permitted. Conveyance of shelled lima beans in water from the harvesting site to the processing site is not considered soaking. Neither is holding shelled lima beans in tanks of water for reasonable periods of time, while the beans are awaiting processing, considered as soaking. "Soaking" means that the lima beans are held for excessive time in tanks of water for the purpose of improving the quality of the beans.

II. VARIETIES

Frozen lima beans must be classified as to varietal type because of the different grade criteria for each type. The U.S. standards classify frozen lima beans into three types: *thin-seeded, thick-seeded, and Baby Potato.*

One industry practice is to screen small sieve sizes from thick-seeded varietal types and label the product as "Baby." Under these circumstances, inspection must be accomplished with the information which the inspector can verify.

The *"Emerald"* variety retains a good, green color through full maturity. It does not grow as large as "Fordhook" and has some pigmentation around the hilum. Classify *"Emerald"* as *"Fordhook."*

"Butter peas," commonly grown in the South, have been determined by the FDA to be lima beans.

"Speckled butter beans" are lima beans, however, they should be graded under the U.S. standards for frozen speckled butter beans.

A new variety called *"Limelight"* which resembles lima beans in appearance and somewhat in flavor is actually derived from the snap bean family. Recent FDA information indicates that "Limelight" should not be labeled as lima beans.

Instances arise when inspection indicates that the product might be "Limelight" or soaked lima beans. Factual data may not be available to support rejection of the product. In these cases, the product can usually be downgraded because of lack of good, green color or lack of tenderness. This is especially true of "Limelight."

III. SAMPLE UNIT SIZES

A. *Lot inspection*:

1. *Use* the entire contents of the container (the "Regulations" specify the sample unit size when sampling from large containers).

B. *In-plant, on-line inspection*:

1. *Select* a 30-ounce sample unit (3-10 oz packages; or 30-oz from large containers such as tote bins and institutional packages).

2. *Select* 200 beans at random from the 30-ounces. Weigh. Use weight to substitute for count in subsequent sample units. Thereafter, count and weigh only every 6th sample unit. Use 200 beans to determine the following:

   a. Color; and

   b. All defects other than HEVM and seriously blemished beans.

3. *Return* the 200 beans to the 30-ounce sample unit.

4. *Use* 30-ounces to determine the following:

   a. HEVM.

   b. Seriously blemished beans. Seriously blemished beans are based on percent, by count. Use the count/weight relationship established in step 2 to estimate the count in 30-

ounces. For example, if 200 beans weigh 2.5 ounces, 30-ounces would contain approximately 2400 beans.

30 ÷ 2.5 = 12; 12 x 200 = 2400 lima beans

Twelve (12) seriously blemished beans equals ½ of 1 percent.

c. Prerequisite quality factors.

IV. SIMILAR VARIETAL CHARACTERISTICS

Easily noticeable mixtures of lima bean varietal types are Substandard. However, mixtures of thin-seeded and thick-seeded Baby Potato lima beans are not easily noticeable. Do not classify them Substandard. Allow 10 percent, by count, of lima beans in the sample unit to be of distinctly different color characteristics, except for speckled butter beans. Score under the factor of color, any color variations that are caused by dissimilar varieties.

Speckled butter beans sometimes occur in green lima beans. Allow two (2) speckled butter beans in any single sample unit. If this allowance is exceeded, the grade is Substandard.

V. QUALITY FACTORS

A. *Color.*

Evaluation of color involves the following determinations:

1. *Percentage* of green lima beans and white lima beans; and

2. *Overall brightness* of the sample unit and any other condition which affects the entire sample unit, such as “off- color.”

Each individual lima bean is only one of three color classes:

1. *Green;*

2. *Pale-green* (less than green but not white); or

3. *White.*

Color limits are fixed by two USDA Frozen Lima Bean Color Standards. Instructions and a scoring guide accompany the standards. The U.S. standards require that skins be removed from thin-seeded lima beans before classifying color. Thick-seeded and thick-seeded Baby Potato lima beans are classified for color with the skins on the beans.

B. *Defects.*

1. *"Light discoloration"* means discolored hila, downey mildew, or other light, scald-like discoloration of the skin of the beans. This condition may also be caused by the friction of the lima beans rubbing together during harvesting. Holding lima beans too long in storage prior to processing may contribute to light discoloration. Follow the guide given in the inspection aid for defects.

2. *"Blemished"* means brown, black, or other discoloration; pathological injury; or any other defect which materially affects the appearance or eating quality of the beans. Classify small diameter insect damage with discoloration as "blemished."

3. *"Seriously blemished"* means worm damage, large diameter insect damage with discoloration, water-damaged (moldy or decayed) beans, or any other defect which seriously affects the appearance or eating quality of the beans. Ordinarily, these defects are serious enough to be removed before eating the product.

4. Aggregate *"pieces of beans"* as outlined in the U.S. standards. The allowance is given in the inspection aid for defects.

5. *"Harmless extraneous vegetable material"* means pieces of the lima bean plant or other plants that are <u>harmless.</u>

6. *Solanaceous plants.* Literature indicates that the toxin in nightshade berries is heat labile (rendered harmless by heat) and therefore non-toxic in processed foods.

7. *Harmful plant material*. Consider harmful plant material, such as puncture vine and foxtail seedheads under Branch guidelines for Foreign Material in File Code 172.

Summary of Requirements

Lima Bean Plant Must be green and tender.		Non-Lima Bean Plant
Flat	Cylindrical	Spherical
Pods and Leaves	Stems	Nightshade berries. Morning Glory seeds and pods. Other weed seeds.

INSPECTION AID FOR DEFECTS

KINDS OF DEFECT	DEFECTS PERMISSIBLE IN SCORE FOR GRADE A				
	40	39	38	37	36
Harmless extraneous vegetable material for: Each 30 ounces net Predominately flat pieces, aggregate area and Predominately cylindrical pieces, aggregate length or Each 30 ounces net Predominately spherical piece not more than 1/4 inch in diameter	{3/16 {None None	{3/8 {3/4 None	{3/8 {1-1/2 None	{9/16 {1-1/2 1 piece	{9/16 sq. inch {1-1/2 inch 1 piece
Pieces of beans (percent by count)	1	3	5	5	5
Shriveled and sprouted beans (percent by count)	None	None	½ of 1	1	1
Blemished beans (percent by count) including Seriously blemished (percent by count)	½ of 1 including 0	1 including 0	1 including 0	1 including ½ of 1	2 including ½ of 1
Above defects plus light discoloration may affect appearance or eating quality	Insignificant			No more than slightly	
Discolored hila and other light discoloration too slight to score as blemishes (percent by count)	5	10	15	15	15

KINDS OF DEFECT	DEFECTS PERMISSIBLE IN SCORE FOR GRADE B			
	X35	X34	X33	X32
Harmless extraneous vegetable material for: Each 30 ounces net Predominately flat pieces, aggregate area and Predominately cylindrical pieces, aggregate area or 30 ounces net Predominately spherical piece not more than 1/4 inch in diameter	{3/4 {1-1/2 1 piece	{3/4 {1-7/8 1 piece	{1-1/8 {2-1/4 2 pieces	{1-1/8 sq. in. {2-1/4 inch 2 pieces
Pieces of beans (percent by count)	6	8	10	10
Shriveled and sprouted beans (percent by count)	1	2	4	4
Blemished beans (percent by count) including Seriously blemished (percent by count)	2 including ½ of 1	2 including ½ of 1	2 including 1	3 including 1
Above defects plus light discoloration may affect appearance or eating quality.	May slightly but not materially.			
Discolored hila and other light discoloration too slight to score as blemishes (percent by count)	20	25	30	35

*Limiting rule. X Partial limiting rule, (applicable to shriveled, sprouted and blemished beans only).

KINDS OF DEFECT	DEFECTS PERMISSIBLE IN SCORE FOR GRADE C			
	*31	*30	*29	*28
Harmless extraneous vegetable material for: Each 30 ounces net Predominately flat pieces, aggregate area and Predominately cylindrical pieces, aggregate length or Each 30 ounces net Predominately spherical piece and more than 1/4 inch in diameter	{1-1/2 {2-5/8 2 pieces	{1-7/8 {2-5/8 2 pieces	{2-1/4 {3 3 pieces	{2-1/4 sq. in. {3 inch 3 pieces
Pieces of beans (percent by count)	12	15	15	15
Shriveled and sprouted beans (percent by count)	5	6	7	8
Blemished beans (percent by count) including Seriously blemished (percent by count)	3 including 1	3 including 1	4 including 1-1/2	4 including 2
Some defects plus light discoloration may affect appearance or eating quality	May materially but not seriously.			
Discolored hila and other light discoloration, slight to scores as blemishes (percent by count)	40	60	80	100

*Limiting rule. X Partial limiting rule, (applicable to shriveled, sprouted and blemished beans only).

B. *Defects (continuation)*

Scoring defects (on- line inspection):

Follow the inspection aid for defects provided with these instructions. Since the inspection aid and the sample unit are standardized for 30 ounces, the score point value to be given for defects is determined by the most offending defect in the sample unit. Score HEVM on the basis of the sample unit; not sample average. An example is as follows:

30 Ounces							
Sample unit no.		1	2	3	4	5	6
HEVM	Flat	3/8 in		3/8 in			
	Cylindrical	3/4					
	Spherical	1				2	
Pieces of beans		1%	1%		3%	1%	2%
Blemished			2%		1/2%	1%	2%
Seriously blemished			1/2%				1/2%
Score points		37	36	39	39	33	36
		HEVM (Spherical) most offending	Blemished most offending	HEVM (Flat) most offending	Pieces of beans most offending	HEVM (Spherical) most offending	Blem-ished most offend-ing

C. Tenderness and maturity.

Variations of the processing and cooking of frozen lima beans affects cotyledon texture. Tenderness, to some degree, can be cooked into lima beans. Hence, follow the USDA cooking procedure closely.

Make a tentative evaluation of tenderness and maturity on the thawed sample unit. Use the cooked sample unit for the final evaluation. Tenderness is a prerequisite quality factor. It is classified as follows:

1. *Tender*. The lima beans are succulent and tender for eating without material starchiness.

2. *Reasonably tender*. The lima beans are slightly firm and mealy or slightly dry.

3. *Fairly tender*. The lima beans are definitely mealy or firm and dry, but are not excessively firm, dry, or mealy.

4. *Substandard*. The lima beans are excessively dry, crumbly, or hard.

D. Flavor.

Flavor may be affected by maturity, delay in processing, inadequate blanch, or the presence of "dirty" cotyledons. An "earthy" taste may accompany units with dirt around the hila or attached to the cotyledons. "Water-damaged" lima beans may taste "musty." Flavor is a prerequisite quality factor. It is classified as follows:

Grades A and B - Good, characteristic flavor and odor.

Grade C - Fairly good flavor that may lack a desirable flavor but is not objectionable.

Substandard - Objectionable but edible.

Classify any inedible sample unit as "worse-than-a-deviant.." (See File Code 165).