Determination of Consumption Norms for Raw Materials and Supplies in Fruit and Vegetable Processing

Aim of the work

- To learn how to determine consumption norms for raw materials and auxiliary supplies in fruit and vegetable processing.
- To calculate raw material requirements based on finished product output.
- To analyze losses and yields during processing.

Theoretical background (brief)

In fruit and vegetable processing industries (canning, drying, freezing, juice production), **consumption norms** indicate how much raw material and auxiliary supplies are required to obtain a unit of finished product.

Consumption norms depend on:

- Type and quality of raw fruits or vegetables
- Processing method (washing, peeling, cutting, blanching, drying, etc.)
- Technological losses (peels, seeds, moisture loss)
- Type of finished product (juice, puree, canned product, dried product)

Correct determination of consumption norms is essential for production planning, cost calculation, and waste reduction.

General formulas

1. **Consumption norm for raw material:** $N = \frac{M_{raw}}{M_{product}}$
2. **Yield of finished product (%):** $Y = \frac{M_{product}}{M_{raw}} \times 100$

where:

- M_{raw} – mass of raw fruits or vegetables (kg)
- $M_{product}$ – mass of finished product (kg)
- N – consumption norm (kg raw material per kg product)
- Y – product yield (%)

Practical example 1: Tomato paste production

Given data:

- Raw tomatoes used: **5000 kg**
- Tomato paste obtained: **1000 kg**

Calculations:

1. Consumption norm: $N = \frac{5000}{1000} = 5.0$
2. Yield: $Y = \frac{1000}{5000} \times 100 = 20\%$

Result:

To produce **1 kg of tomato paste**, **5 kg of raw tomatoes** are required. Product yield is **20 %**.

Practical example 2: Apple juice production

Given data:

- Raw apples used: **3000 kg**
- Apple juice obtained: **2100 kg**
- Processing losses: **10 %**

Step 1: Effective raw material

$$M_{effective} = 3000 \times (1 - 0.1) = 2700\ kg$$

Step 2: Consumption norm

$$N = \frac{2700}{2100} = 1,29$$

Result:

The consumption norm for apple juice is **1.29 kg of apples per 1 kg of juice**.

Practical example 3: Dried carrot production

Given data:

- Raw carrots used: **2000 kg**
- Dried carrots obtained: **300 kg**

Calculations:

1. Consumption norm: $N = \frac{2000}{300} = 6,67$
2. Yield: $Y = \frac{300}{2000} \times 100 = 15\ \%$
3. **Result:**

To produce **1 kg of dried carrots**, **6.67 kg of raw carrots** are required.

Consumption of auxiliary supplies (example)

Given data:

- Salt used for pickling: **50 kg**
- Finished pickled vegetables: **1000 kg**

Calculation:

$$N_{salt} = \frac{50}{100} = 0,05\ kg/kg$$

Result:

Salt consumption norm is **0.05 kg per 1 kg of finished product**.

Independent practical tasks

1. **Canned peas production**
   Raw peas used: 4000 kg
   Finished product: 3000 kg
   Calculate consumption norm and yield.
2. **Grape juice production**
   Raw grapes used: 5000 kg
   Juice obtained: 3500 kg
   Losses: 8 %
   Calculate effective raw material and consumption norm.
3. **Dried apple production**
   Raw apples used: 6000 kg
   Dried apples obtained: 900 kg
   Calculate consumption norm and yield.

Conclusion

Determining consumption norms for raw materials and supplies allows efficient use of resources, accurate cost calculation, and improved productivity in fruit and vegetable processing.