Practical work 2

Calculation of natural weight losses of fruits and vegetables during storage.

Aim of the work

- To study the causes of natural weight losses of fruits and vegetables during storage.
- To calculate weight losses using standard loss norms.
- To analyze the effect of storage conditions on product preservation.

Theoretical background (brief)

During storage, fruits and vegetables lose part of their weight due to **natural physiological processes**. These losses are unavoidable and are called **natural weight losses**.

Main causes of natural weight loss:

- **Moisture evaporation (transpiration)**
- **Respiration processes**
- **Shrinkage during ripening**
- **Influence of temperature, humidity, and storage duration**

To evaluate storage efficiency, standard natural loss rates (in %) are applied depending on the product type and storage period.

Main formulas

1. **Natural weight loss amount (kg or t):**

$$L = M_0 \frac{P}{100}$$

where:

M_0 – initial mass of fruits or vegetables (kg or t)

P – standard natural loss rate, %

L – natural weight loss amount

2. **Final mass after storage:**

$$M_1 = M_0 - L$$

Practical example

Given data:

- Product: **Apples**

- Initial mass: **2000 kg**
- Storage period: **4 months**
- Storage conditions: **cold storage**
- Standard natural weight loss rate: **3.0 %**

Calculations:

1. Natural weight loss:

$L = 2000\frac{3}{100} = 60$ kg

2. Final mass after storage:

$$M_1 = 2000 - 60 = 1940\,kg$$

Result:

During 4 months of storage, **60 kg** of apples is lost naturally, and **1940 kg** remains at the end of storage.

Independent practical tasks

1. **Potatoes** with an initial mass of **5000 kg** are stored for **6 months**. The standard natural weight loss rate is **5.0 %**. Calculate:
    - natural weight loss amount
    - final mass after storage
2. **Carrots** with an initial mass of **1200 kg** are stored for **3 months**. The standard natural weight loss rate is **4.0 %**. Calculate:
    - natural weight loss amount
    - final mass after storage
3. **Onions** with an initial mass of **3000 kg** are stored for **5 months**. The standard natural weight loss rate is **6.0 %**. Calculate:
    - natural weight loss amount
    - final mass after storage

Conclusion

The calculation of natural weight losses allows proper assessment of storage efficiency and helps optimize storage conditions to reduce product losses.