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# Economic impact assessment of a scenario of "sudden" rupture of essential vitamin supplies from China to the EU:

## 29 Bio. € losses due to substantial reduction of EU livestock production (pig & poultry)

**NOTE**: the following impact assessment is only considering the direct economic impact on the EU livestock output of a shortage in vitamins due to rupture of imports from China. It does not take into account:

- Shortages due to other scenarios, e.g. a rupture of supply from other origins, including the EU, due for example to an industrial incident
- Other knock-on economic impacts, e.g. on the market for commodities due to lower feed demand, on the downstream part of the chain or on consumer prices
- The social impact, i.e. on farmers' wellbeing and animal welfare & health.

Furthermore, it is based on the global industry structure of 2023. It does not take into account any change in production patterns and the "survival" of existing production sites in Europe.

This is one disruption scenario among others, for example an industrial incident in a European production plant.

## SCENARIO

- **Baseline**
  - Vitamins destined to feed use are produced by a limited number of countries: China (all), EU (A, B1, B2, B4, B5, B6, B12, D3, E), Switzerland (A, B3, B9, E), UK (B5, C), South Korea (B2), USA (B4), India (B3, D3), Vietnam (B4), Türkiye (K3) and Uruguay (K3).
  - Current production and production capacities for each vitamin and each country are those reported in the FEFAC study on "EU Vulnerability for the Sourcing of Essential Nutritional Feed Additives" of 2025
- **Assumption**
  - The exports of vitamins from China to Europe and the US stop for an undefined period, but not to other countries.
  - The EU stocks are equivalent to one month's consumption.
  - The EU cannot diversify its sourcing beyond Switzerland, Turkey and Great Britain.
  - European producers of vitamins need 12 months to reach full production capacity.
- **3 scenarios:**
  - S1: The EU, Switzerland, Türkiye and Great Britain increase their production with priority to meet the European demand (EU and beyond)
  - S2: The EU, Switzerland, Türkiye and Great Britain increase their production without priority to the European demand
  - S3: The EU gives priority to the EU demand, not Switzerland, Türkiye and Great Britain.
- **Indicator considered: output of the livestock chain (€)**

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## RESULTS

- **Availability**

Based on these three scenarios and data from the FEFAC study on EU vulnerability for the sourcing of essential nutritional feed additives, the supply of vitamins would be as follows:

- No shortage of Vitamins A and E whatever the scenario
- Shortage during the first 12 months for Vitamins B1, B2, B3, B4, B6, B12, D3, and K3
- Long term shortage for Vitamins B9, C and H.

Details on the situation of each vitamin are provided in annex 1.

- **Economic impact:**
  - For **ruminants** the impact would be limited due to sufficient sourcing of vitamins A and E and limited reduction of supply for Vitamin D3[1] during first 6 months, that may be also compensated by existing stocks. Vitamins of the B-complex are synthetised for the majority by the animals and deficit in availability of these vitamins may be offset at limited costs.
  - For **monogastrics**:
    - In the first 12 months:
      - No reduction in supplementation with Vit A and E
      - Reduction of supplementation of B2, B3, B4 and D3 with limited impact in all scenarios
      - Sharp reduction of supplementation in B1, C and K3, with medium impact
      - Dramatic reduction of supplementation in B6, B12, B9 and H, with high impact.

      Based on expert assessment (see annex 2) and the outcome of the IFEEDER study[2], the reduction of performance (increased mortality, lower growth, deformities) translates into:
      - For pigs: a reduction of the output per animal (marketable carcass weight) that can be estimated at 15% (between 9 and 22%). A reduction of the number of animals may also be expected (-5%).
      - For poultry for fattening: -35% of meat (both loss of marketable carcass weight and reduction of the number of animals)
      - For laying hens: -35% of egg production (combining reduction of the number of pullets, lay rate and egg size).
    - Beyond 12 months
      - No reduction in supplementation with Vit A, B1, B2, B3, B4, B6, B12, D3, E and K3
      - Sharp reduction in supplementation of Vit C with medium impact
      - Sharp reduction in supplementation of Vit B9 and H with high impact.

      The reduction in performance may be estimated overall at 5% in Y+2, with a stepwise recovery between Y and Y+2 in terms of number of animals reared.

Starting from the value of the livestock output in 2025 as a baseline and not considering the obvious impact of the reduction in volumes on prices for consumers, the impact on the value of EU livestock output can be estimated at 29 bio. € in the first year and 5 bio. € in the longer term.

[1] Since Vitamin D3 it is produced in Europe from precursors imported from China, this may affect the possibility of Europe to increase and even maintain its production

[2] Study on Supply Chain Assessment: Vitamin and Amino Acid Supply, Demand and Potential Disruption Impacts – IFEEDER 2025

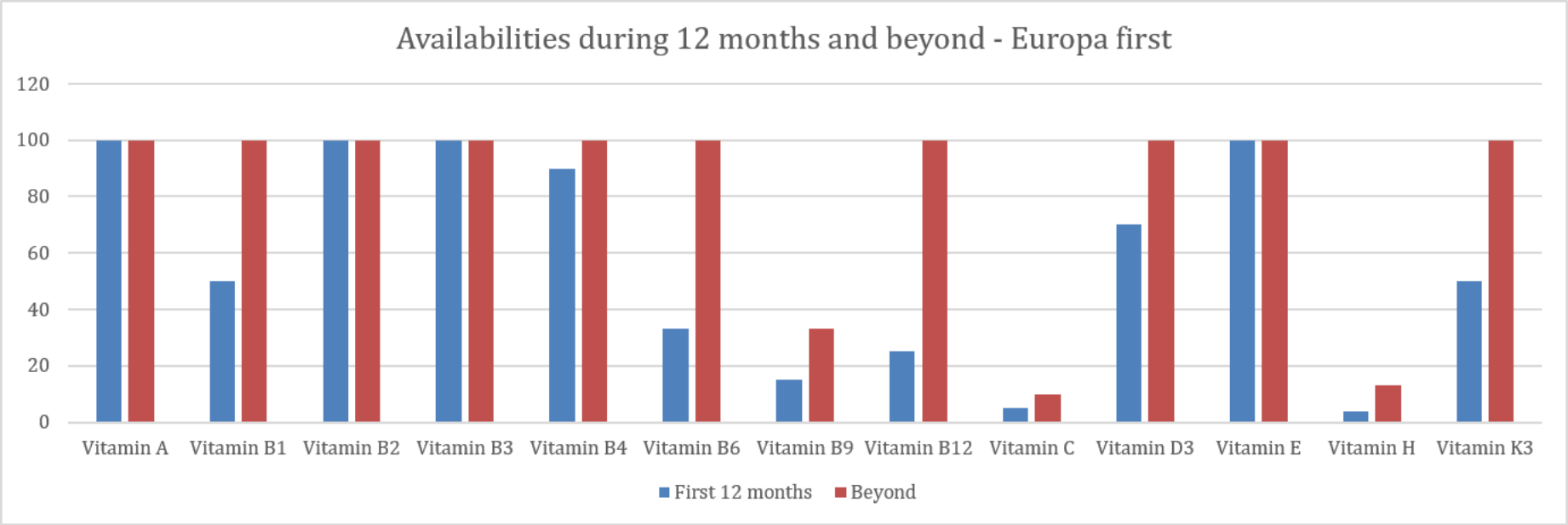
| Output (bio. €) | Baseline (2024) | Y | Y+2 |
|---|---|---|---|
| Pig | 48 | 38.5 | 45.5 |
| Poultry for fattening | 27 | 15 | 25.5 |
| Eggs | 17 | 9.5 | 16 |
| Total | 92 | 63 | 87 |

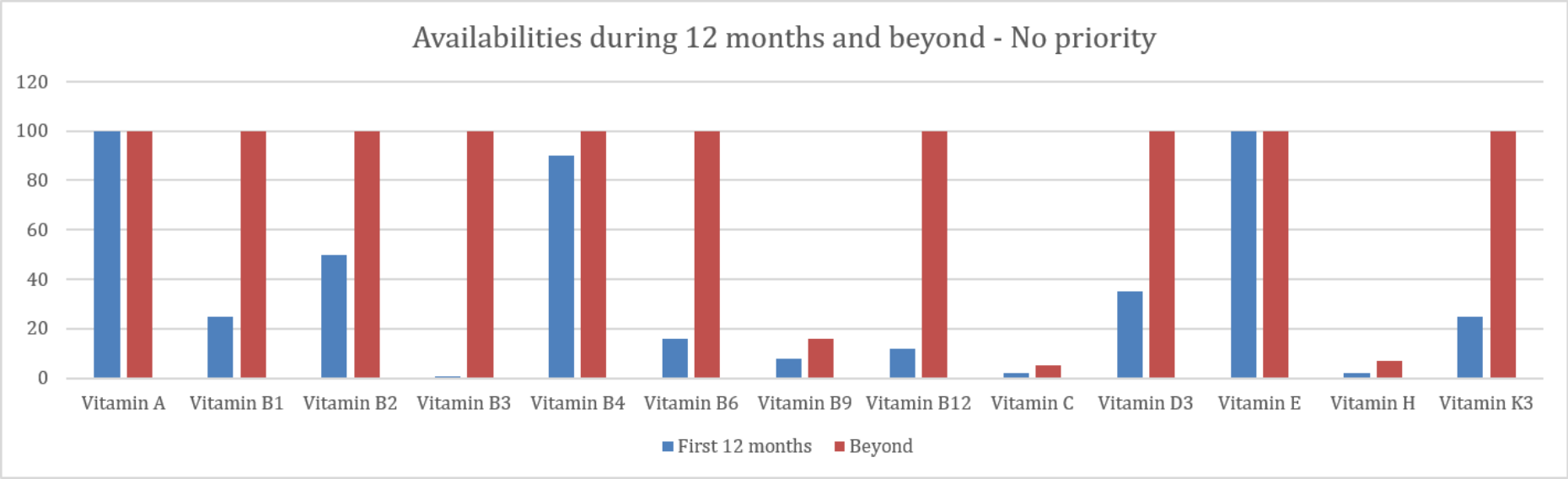
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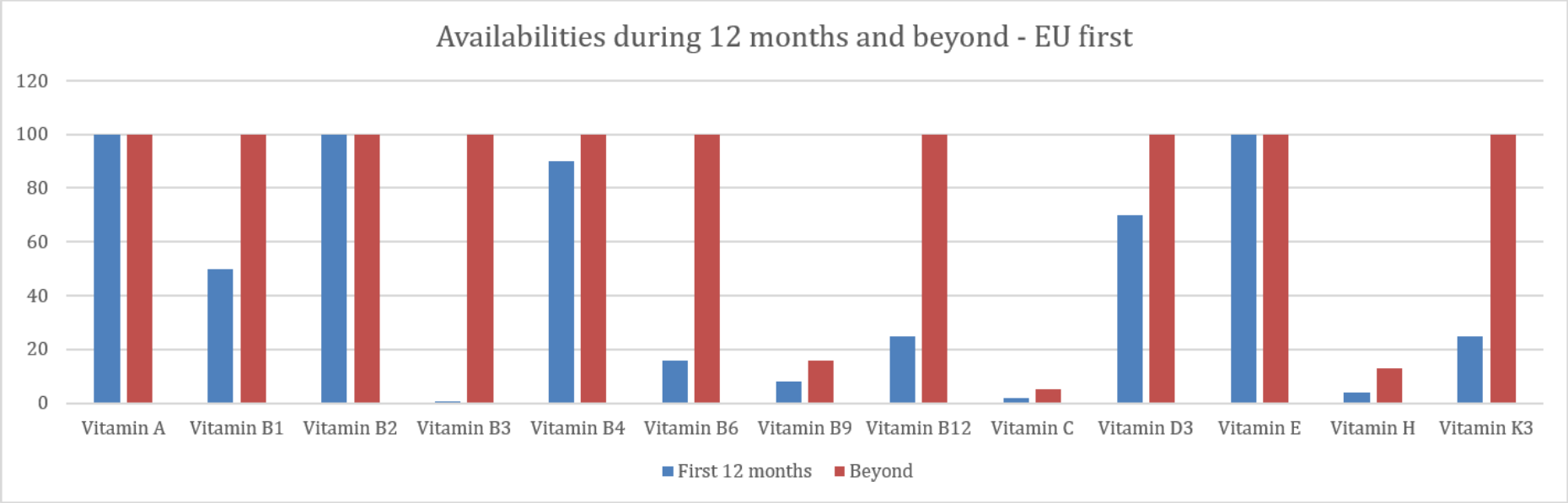
**Availability of different vitamins as a result of a rupture of the supply chain of imported vitamins**

**Scenarios:**

- S1: Europa first: The EU, Switzerland, Türkiye and Great Britain increase their production with priority to meet the European demand (EU and beyond)
- S2: No priority: The EU, Switzerland, Türkiye and Great Britain increase their production without priority to the European demand
- S3: EU first: The EU gives priority to the EU demand, not Switzerland, Türkiye and Great Britain.




Availabilities during 12 months and beyond - No priority
120
100
80
60
40
20
0
Vitamin A
Vitamin B1
Vitamin B2
Vitamin B3
Vitamin B4
Vitamin B6
Vitamin B9
Vitamin B12
Vitamin C
Vitamin D3
Vitamin E
Vitamin H
Vitamin K3
First 12 months
Beyond


Availabilities during 12 months and beyond - EU first
120
100
80
60
40
20
0
Vitamin A
Vitamin B1
Vitamin B2
Vitamin B3
Vitamin B4
Vitamin B6
Vitamin B9
Vitamin B12
Vitamin C
Vitamin D3
Vitamin E
Vitamin H
Vitamin K3
First 12 months
Beyond

| | Percentage of EU demand | | | | | | Comments |
|---|---|---|---|---|---|---|---|
| | S1 | | S2 | | S3 | | |
| | First 12 months | Beyond | First 12 months | Beyond | First 12 months | Beyond | |
| Vitamin A | 100 | 100 | 100 | 100 | 100 | 100 | Only EU, CH and China produce.<br>Production capacity in Europe is above China.<br>Current EU production exceeds the EU needs.<br>Current EU and CH production exceeds European + US needs |
| Vitamin B1 | 50 | 100 | 25 | 100 | 50 | 100 | Only EU and China produce.<br>Production capacity in EU exceeds European + US needs.<br>Current EU production is 50% of EU needs.<br>Current EU production is 25% of European + US needs |
| Vitamin B2 | 100 | 100 | 50 | 100 | 100 | 100 | Produced in EU, South Korea and China.<br>Production capacity in EU exceeds European + US needs.<br>Current EU production is 100% of EU needs.<br>Current EU production is 50% of European + US needs |
| Vitamin B3 | 100 | 100 | 66% | 100 | 66% | 100 | Produced in EU, India, CH and China.<br>Current EU production is 2% of EU needs.<br>Current European production exceeds European needs and represents 2/3 of European + US needs<br>Production capacity in EU is 25% of EU needs.<br>Production capacity in Europe exceeds European and US demand |
| Vitamin B4 | 90 | 100 | 90 | 100 | 90 | 100 | Production in EU, China, USA, Vietnam and India<br>Current EU production is 90% of EU needs.<br>Current US production meets US demand<br>EU production capacity exceeds European needs. |
| Vitamin B6 | 33 | 100 | 16 | 100 | 16 | 100 | Production in EU and China.<br>Current EU production is 33% of EU needs.<br>EU production capacity exceeds European and US demand |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Vitamin B9 | 15 | 33 | 8 | 16 | 8 | 16 | No production / production capacity in EU<br>Production in China, CH and India<br>Current CH production is 15% of European needs<br>CH production capacity represents 1/3 of European demand and 1/6 of European + US demand.<br>Indian production capacity is 1/3 of the CH capacity |
| Vitamin B12 | 25 | 100 | 12 | 100 | 25 | 100 | Production in EU and China.<br>Current EU production is 25% of EU needs.<br>EU production capacity equal European and US needs |
| Vitamin C | 5 | 10 | 2 | 5 | 2 | 5 | No production / production capacity in EU<br>Production in China and GB<br>China holds 95% of the production and production capacity<br>Share of feed in total demand is very low<br>Indian production capacity is 1/3 of the CH capacity |
| Vitamin D3 | 70 | 100 | 35 | 100 | 70 | 100 | Only EU, India and China produce.<br>Current EU production is 70% of EU needs<br>Current EU production capacity exceeds European + US needs. |
| Vitamin E | 100 | 100 | 100 | 100 | 100 | 100 | Only EU, CH and China produce.<br>Current EU production is 40% of EU needs<br>Current EU production capacity exceeds EU needs.<br>Current European production meets EU and US demand |
| Vitamin H | 4 | 13 | 2 | 7 | 4 | 13 | Only EU and China produce.<br>China holds 99% of production and production capacity<br>Current EU production is 4% of EU needs<br>Current EU production capacity is 13% of EU needs and 7% of European + US needs. |
| Vitamin K3 | 50 | 100 | 25 | 100 | 25 | 100 | Production in China, Turkey and Uruguay<br>China holds 75% of production and production capacity<br>Current European production is 50% of EU needs<br>European Production capacity exceeds European and US needs |

Annex 2
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# Annex 2: Evaluation of the impact of a shortage in vitamins on livestock performance in the EU

## 1. Case of pigs and sows

**Assumptions**:

| Scenario | Assumed vitamin availability | Nature of the impact |
|---|---|---|
| 1 - Short term (< 12 months) | - 10%: B2, B3, B4, D3<br>- 50%: B1, C, K3<br>- 90 to -98%: B6, B12, B9, H | Acute and multiple shock. Priority risk for reproduction, piglets, and pigs with low fertility or low safety margins. |
| 2 - Long term (> 12 months) | - 50%: Vitamin C<br>- 90 to -98%: B9 and biotin (H) | A more targeted and lasting shortage. The expected effect is primarily focused on the reproduction and longevity of sows. |

**Role of different vitamins and hierarchisation of importance for the indicator considered**

| Vulnerability in order of priority | Vitamins | High-risk functions | Most exposed categories |
|---|---|---|---|
| Very high | B9, B12 | Single-carbon metabolism, hematopoiesis, embryonic development and reproduction. B9 and B12 should be considered together. | Sows around the time of breeding and in early gestation, foetuses and young animals. |
| High | H, B6 | Biotin: skin, hooves and locomotion. B6: amino acid metabolism and immune functions. | Sows, fast-growing animals, farms already exhibiting weaknesses in plumb lines. |
| Intermediate | D3, K3, B2, B1 | Phosphocalcic metabolism, coagulation, energy metabolism. The impact depends strongly on the initial margins and the duration. | Young animals, sows, health or food situations unfavourable. |
| Weaker in the scenarios described | B3, B4, C | Vitamin C is synthesized by pigs. However, supplementation may be beneficial in situations of stress. | These are generally side effects of severe deficiencies in B9, B12, B6 and biotin. |

## Definition of an overall objective indicator

The recommended indicator is marketable annual production, in order to combine reproduction, survival and growth without directly adding percentages of different natures.

**Marketable carcass weight in kg / sow present / year**

**= litters / sow / year × weaned / litter × weaning-to-slaughter survival × average carcass weight**

The feed conversion ratio should be presented separately as an indicator of efficiency and additional feed requirements, since its deterioration does not automatically reduce the tonnes produced when the fattening period can be extended.

## Impact on several KPI and on the overall livestock output

| Technical indicator | Benchmark | Short term |
|---|---|---|
| Birth rate | 88% | - 3 to - 8 % |
| Weaned / litter | 13.0 | - 0.7 to - 1.7 |
| Pre-weaning mortality | 14% | + 1.5 to + 4.0 % |
| Mortality at weaning and slaughter | 5% | + 0.5 to + 2 % |
| GMD weaning-slaughter | Reference livestock | - 4 to - 10% |
| Consumption index | Reference livestock | +1 to +4% |
| Sow reforms / losses | Reference livestock | +3 to + 8% |
| **Marketable production** | **100** | **Index 78 to 91** |

## 2. Case of poultry for fattening and eggs

For birds, the assessment is based exclusively on a shortage in vitamin B12, assuming no supplementation is possible anymore.

Complete inability to provide B12 supplementation to animals—whether laying hens (for table eggs or breeding) or poultry raised for meat.

For the purpose of this analysis, it is assumed that any loss of chicks is not replaced during the rearing period.

Literature findings:

| Technical indicator | Study conclusions |
|---|---|
| Laying rate | 0 to -8% after 10 weeks |
| Egg size | 0 to -5.5g after 10 weeks |
| Hatchability | -34 to -47% after 4 weeks of deficiency |
| Mortality | 0 to -15% (higher in younger animals) |
| Live weight (meat poultry) | 0 to -80g |

No study is available covering the entire rearing period of a pullet (future laying hen).

Similar and even higher impact was also reported in literature due to a deficit in biotine (Vitamin H).

Overall impact calculations:

A drop in hatchability from 90% to 55% means only 60% of the required number of chicks would be available.

- For meat poultry, a conservative estimate would be a 3% loss in live weight and a 5% increase in mortality during the production cycle.

  Production without B12 = Current production × 0.6 (40% fewer chicks at the start) × 0.97 (lower weight at slaughter) × 0.95 (additional mortality) = 45% loss in total meat poultry production.

- For laying hens, a conservative estimate would be a 2% reduction in the lay rate and a 3% decrease in egg size.
  Production without B12 = Current production × 0.6 (40% fewer pullets at the start of the production cycle) × 0.95 (additional pullet mortality) × 0.98 (loss in egg-laying rate) × 0.97 (decline in egg mass) = 46% loss in total egg mass for the table-egg sector.