Magnesium:
Nervous tremor, gasping, and convulsions at hatching.

Phosphorus:
Abnormal bone formation, stunting; mortality peaks during days 14 to 16.

Copper:
Blood and circulatory system defects. Mortality peaks during days ≤3.

Iodine:
Affects thyroid activity. Deficiency or excess causes increased incubation time, decreased growth, and increased mortality. Thyroid may be enlarged.

Selenium:
Exudative diathesis; selenium will spare vitamin E. Very high levels of selenium are toxic: edema of head and neck, twisted legs, necrosis in brain and spinal cord, short upper beak, missing eyes, protruding eyes, an increase in malpositions.

Molybdenum:
>17 ppm in the egg results in 100% mortality by day 12.

Lithium:
Excess causes high embryonic mortality associated with inhibited development, eye defects, enlarged aorta, abnormal neural tube.

Boron:
Excess boron in egg (44 ppm) causes embryonic mortality in early development and at day 13. Abnormalities similar to those of riboflavin deficiency. Face, beak, and appendicular skeleton abnormalities.

Protein, amino acids:
Deficiency, excess, or imbalance of some amino acids can cause embryonic abnormalities and mortality. Abnormalities include small or abnormal upper and/or lower beak, disorganized protrusions in the brain, exposed viscera, twisted and shortened limbs, twisted spine, short body, degeneration of the eye.

Fat, fatty acids:
Linoleic acid deficiency: slow development, 75% of embryos in the head-over-right-wing malposition; mortality peaks during days 1 to 4, 8 to 14, and >21. Lipid transfer from the yolk to the embryo is reduced in the first few eggs produced by young pullets; this appears to result in increased embryonic mortality.

Phosphorus: 39. Miscellaneous substances:
Tetracyclines:
Inhibition of skeletal mineralization, erosion of long-bone cartilage, skeleton malformation.

Sulfanilamides:
Retarded growth, shortened long bones, extreme micromelia, parrot beak, rumplessness.

Penicillin:
Edema and hemorrhage in wings, legs, and head.

Aflatoxin B1:
Stunting (beginning at day 12), small liver, high mortality.

Ammonia (in incubators):
No closure of neural tube, mortality.

40. Microorganisms:
Infectious bronchitis:
Stunting, retarded lung development, small heart, enlarged spleen. Small chick resulting from thin, porous shell and excessive water loss.

Newcastle disease:
Reduced growth, small amnion, abnormalities in neural and sensory tissues in early embryo.

Botulism:
Muscle atrophy, fat accumulation, joint problems, short upper beak.

Staphylococcus:
Extensive hemorrhages and tissue damage.

Streptococcus:
Destruction of the synovial lining of the joints.

E. coli:
Rots.

Aspergillus:
Black or dark green rots. Embryo red or dark, dwarfed.

S. pullorum, S. gallinarum, and S. typhimurium:
Egg transmitted. Embryonic septicemia, high embryonic mortality, high chick mortality.