Guidelines for the Application and Addition of Blueberry Extract

1 Scope

These guidelines apply to the addition operation, process control, quality safety, and compliance management of blueberry extract (blueberry anthocyanins), which is produced from the fruits of **blueberry (Vaccinium corymbosum L.)** via extraction, purification, concentration, and drying, in the fields of food, health food, cosmetics, feed, industry, etc.

2 Normative References

- Announcement No. 3 of 2023 by the National Health Commission (blueberry anthocyanins as new food raw material)
- GB 2760 National Food Safety Standard for the Use of Food Additives
- GB 14881 National Food Safety Standard for General Hygienic Practice for Food Production
- Safety and Technical Standards for Cosmetics (2015 Edition)
- Catalogue of Feed Additives and relevant specifications

3 Terms and Definitions

- **Blueberry extract**: Powder or extract obtained from blueberry fruits by water/ethanol extraction, purification, and drying, with anthocyanins as the core functional component.
- **Blueberry anthocyanins**: A nationally approved new food raw material, with anthocyanin content **≥40%**, recommended daily intake ≤ 800 mg/day.
- **Addition operation**: The whole process of quantitatively adding blueberry extract into the system according to formula and process and dispersing it uniformly.

4 Raw Material Quality Requirements

- Appearance: Purplish red to dark purple powder/extract, no odor, no caking, no foreign impurities
- Anthocyanin content: ≥25% / ≥40% (according to product specification)

- Loss on drying: ≤5%
- Ash content: ≤5%
- Heavy metals: Pb ≤ 2 mg/kg, As ≤ 1 mg/kg, Cd ≤ 0.5 mg/kg, Hg ≤ 0.1 mg/kg
- Microorganisms: Comply with hygienic requirements of the corresponding field
- Storage: Sealed, cool and dry, protected from light and moisture; shelf life 12–24 months

5 Specifications for Addition in Food Products

5.1 Compliance Scope and Maximum Usage Level (Blueberry Anthocyanins)

- Milk and dairy products (modified milk / flavored fermented milk): 0.8 g/kg
- Liquid beverages: 0.8 g/kg; solid beverages calculated after reconstitution
- Frozen drinks: 8 g/kg
- Bakery products: 4 g/kg
- Confectionery: 40 g/kg
- Cocoa / chocolate products: 14 g/kg
- Jelly: 14 g/kg
- Alcoholic beverages: 4 g/kg

5.2 General Operation Flow

1. Material picking and verification: product name, batch number, anthocyanin content, expiry date
2. Pretreatment: Powder sieved through 40–80 mesh; extract preheated to 40–50°C and stirred evenly
3. Pre-dispersion: Dissolved with purified water / ethanol / syrup to prepare 5%–10% mother liquor
4. Addition process:
    - Beverages / dairy products: Added during flavoring stage, stirred for 10–20 min until uniform
    - Confectionery / chocolate: Added after cooking and cooling to avoid high-temperature degradation

- Baking: Added during dough mixing / batter preparation, baking temperature ≤ 180℃

5. Homogenization / filtration: Remove insoluble substances to ensure uniform color
6. Filling and sterilization: Pasteurization / UHT preferred to reduce anthocyanin loss

5.3 Key Process Control Points

- Dissolution temperature: ≤60℃
- Suitable pH: 3.0–5.0 (stable for anthocyanins)
- Avoid direct contact with strong oxidants, iron / copper ions
- Finished products stored in light-proof, sealed, low-temperature conditions

6 Specifications for Addition in Health Food

6.1 Applicable Dosage Forms

Tablets, capsules, soft capsules, granules, oral liquids, solid drinks, etc.

6.2 Addition Level and Daily Intake

- Calculated as blueberry anthocyanins (≥40%): ≤ 800 mg/day
- Common blueberry extract: Converted by anthocyanin equivalent, not exceeding the upper limit
- Formula shall clearly state daily intake, warning statements, unsuitable 人群

6.3 Operation Requirements

- Weighing accuracy: ±0.1%
- Mixing uniformity: RSD ≤5%
- Granulation / tableting: Humidity ≤60%, temperature ≤60℃
- Labeling: Raw material name, anthocyanin content, intake limit

7 Specifications for Addition in Cosmetics

7.1 Applicable Categories

Skin toners, essences, emulsions, creams, masks, eye products, sunscreen and repair products.

7.2 Recommended Addition Ratio

- Recommended dosage: 0.5%–3% (based on total formula mass)
- Enhanced efficacy type: 2%–5% (safety verification required)

7.3 Operation Flow

1. Addition timing: **aqueous phase cooled to 40–50℃** or cooling stage after emulsification
2. Dispersion method: Stir for 10–15 min until fully dissolved / uniform
3. pH control: 4.5–6.5 (stable and less discoloration)
4. Compatibility contraindications: Avoid strong alkalis, strong reducing agents, high-concentration ions

7.4 Quality Control

- Retain samples for observation of color, odor, stability
- Conduct tests for microorganisms, heavy metals, irritation
- Light-proof packaging; brown / opaque materials recommended

8 Feed and Industrial Applications

8.1 Feed Additives

- Addition level: 0.1%–1% (formula feed)
- Functions: Antioxidation, color improvement, palatability enhancement
- Process: Premix then scale up mixing step by step

8.2 Textile / Leather / Wood

- Dyeing / finishing: 0.5%–2% (mass fraction of treatment solution)

- Wood preservation: 1%–5% (based on wood mass)
- Operation: Dissolution → impregnation / spraying → drying and curing

9 General Occupational Safety and Hygiene

- Operators wear work clothes, masks, gloves
- Batching area: dust-proof, ventilated, light-proof
- Special equipment, thoroughly cleaned after use
- Prevent cross-contamination and pests
- Records: material picking, weighing, addition time, parameters, batch, operator

10 Quality Inspection and Release

- Per-batch testing: appearance, content, loss on drying, ash, heavy metals, microorganisms
- Food / health food comply with new food raw material announcement and GB 2760
- Cosmetics comply with Safety and Technical Standards for Cosmetics
- Non-conforming products isolated, labeled, disposed according to regulations

11 Storage and Transportation

- Conditions: Cool, dry, ventilated; temperature ≤25℃, humidity ≤60%
- Protection: Light-proof, sealed, moisture-proof, odor-proof
- Transportation: Rain-proof, sun-proof, moisture-proof; not transported with toxic and hazardous materials

12 Labeling Requirements

- Food / health food: raw material name, anthocyanin content, production date, shelf life, storage conditions, intake limit

- Cosmetics: INCI name (Vaccinium Myrtillus Fruit Extract), usage method, precautions
- Industrial / feed: purpose, addition level, safety warnings

13 Emergency and Abnormality Handling

- Discoloration / degradation: Check temperature, pH, metal ions, light; adjust process
- Uneven dispersion: Optimize pre-dispersion, extend stirring, replace solvent system
- Over-limit risk: Review formula, weighing, daily intake conversion
- Leakage / contamination: Isolate immediately, clean and disinfect, assess risk

14 Supplementary Provisions

- These guidelines are technical operation specifications; specific products shall comply with national regulations and enterprise standards
- Blueberry anthocyanins are new food raw materials, not suitable for infants, pregnant women, and lactating women
- Enterprises shall establish a traceability system for full-chain traceability from raw materials to finished products