Defective Milk Protocol

<table>
<thead>
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<th>Swirl and sniff before tasting and expectorating.</th>
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<td>Store all at 4°C.</td>
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<td>For calculations - At 29.6 mls/oz, there are 1894 mls/half gallon.</td>
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CONTROL - **Protect from light and keep cold.**

Flat - watery, less sweet, tasteless
Substitute 300 mls spring water for 300 mls milk per half gallon for approx. 15% flat.

Feed - sweet hay aroma and grassy taste (or fermented silage/alcohol odor) *(May be weighed ahead and stored in freezer.)*
Removing stems and dried pieces, weigh 10 g of alfalfa into a zip-lock bag* and add 100 mls spring water.
Make several batches at once in separate bags. *(Note: Do not double batches in same bag - makes weaker “feed.”)*
Squish 20 times to mix and extract feed flavor and hold under refrigeration for 1 hour, mixing often.
Catching alfalfa in strainer, pour liquid into a wide cool whip-type container to commingle batches.
Squeeze bags to press out all liquid, then pour commingled liquid into another container through cheesecloth by
pouring liquid directly (to minimize loss) through hole of a funnel lined with loose cheesecloth.
Tighten lids, store in fridge. Carefully pipet and substitute for 60 mls of milk per half gallon for a “definite” feed flavor.
Alternative Method: Sitr alfalfa together with water in a pot and cook on the stove until boiling.
Strain out alfalfa as described above, and add 60mls per half gallon.

Light Oxidized - plastic odor and taste (or tallowy or burnt feathers)
Place milk (in clear or translucent container) into a cooled light box or in front of light in a cooler.
Expose for at least 6 hours (overnight is OK) at 2000 lux (use light meter to check intensity).
Or in direct sunlight on ice:  Slight - 8-9 min. DEFINITE - 10-11 min. Pronounced - 12-15 min.

Malty - similar to Grape Nuts cereal or malt in malted milk balls
Add 15 g Grape Nuts cereal to 100 ml milk.
Strain through cheesecloth and add back into original refrigerated half gallon.

Acid - tingling buttermilk taste
Cover, swirl well and let sit in fridge for 30 minutes, swirling occasionally.
Substitute 300 mls buttermilk (preferably highly acidic, unsalted) for 300 mls of milk per half gallon.
For Acid/Malty mixture - add 30 g Grape Nuts to 100 mls, strain after 1/2 hour, substitute 200 with buttermilk, then combine.

Rancid - cheesy, pungent odor - will smell like baby's vomit when rubbed on wrist
20 g strong American provolone (not smoked & kept frozen until use)/half gallon
Leave in large chunks that will still fit through funnel to prevent milk contact with too much salt.
Let sit for 24 hours. Strain through cheesecloth into original half gallon container that has been kept under refrigeration.

Garlic/Onion - odor and taste of either/both
Pour one half gallon of milk into another clean container. Add 1.5 g (e.g., 150 mls juice:25 mls vinegar; freeze 25 ml aliquots) hold for 1/2 hour, inverting several times. Filter through cheesecloth. Add 2 mls liquid onion. Mix well.

Bitter - lingering aftertaste as from tonic water (quinine), strong coffee, grapefruit - no odor by itself
Add 1.00 g caffeine to 300 mls milk. Add stir bar and stir vigorously on stir plate for 30 minutes.
Add back to refrigerated half gallon for a “definite” bitter flavor.

Salty - may occur in herds with high rates of mastitis or if farmer is attempting to mask added water
5.68 g NaCl/half gallon for definitely (“5”) salty. Adjust as needed.

Foreign/Chemical - odor/taste from exposure to chlorine, sanitizer, cow medications, exhaust fumes, citrus fruits.
Make dilute solution in a vial for “odor only.” 2% chlorine solution - 4 mls/200 mls water for 20 vials
Or - add plant's chemical sanitizer to a detectable level.

Lipid Oxidized/Metallic - exposure to light or auto-oxidation of unsat. fatty acids (phospholipids) - catalyzed by certain metals -
(copper, iron) - spontaneous – related to cow condition (lack of anti-oxidants, e.g., vitamin E) or high fat feeds (e.g., soy beans).
Crush and add 3 oxidized (old) unsalted crackers per 1/2 gallon. Mix well, let sit in fridge 1 hour. Strain.
Or: Dip 2 pennies in rubbing alcohol. Let dry and allow to sit in a gallon of milk for 2 hours. Mix well.

Unclean- store samples under refrigeration for an extended amount of time. Select “putrid” smelling sample.

Originally created by Nancy R. Carey, Cornell University, Milk Quality Improvement Program. Edited and revised by Chelsey Keeler and Joshua Jones, Purdue University Food Science Department graduate students.