Formula preparation machines: Tommy Tippee Close to Nature Perfect Prep™

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Formula Preparation Machines

Formula preparation machines are marketed as being a sterile and convenient method of preparing formula feeds at the correct temperature for consumption 'within minutes'. In the UK, the most popular formula preparation machine currently available at high street retailers is the Tommee Tippee Close to Nature Perfect Prep™ machine that retails at about £70. More expensive versions of these machines are available, such as the Baby Brezza Formula Pro (which retails at £167) which uses a similar method of making up the milk described below.

The Tommee Tippee Close to Nature Perfect Prep™ machine claims to "*prepare a fresh bottle at just the right serving temperature within 2 minutes".* The machine uses a two-step process to prepare the feed. In the first step the machine dispenses a "hot shot" of water directly into the bottle. The user then has two minutes to add the PIF, place the holding cap on the bottle, shake to mix and return the bottle to the machine. In step 2, cold water is added by the machine to make up the selected feed volume to a comfortable temperature to feed immediately.

Whilst research into the safety and efficacy of the Perfect Prep™ Machine has been carried out by the manufacturer, this is not currently in the public domain and the manufacturer has declined to release it for business competition reasons. Mayborn Group Ltd. who produce Tommy Tippee brand products have said:

'Our Perfect Prep product has been tested by an independent laboratory that validated that the 'hot shot' of water addressed the (E.Sakazakii) species of concern. The laboratory used was Intertek Testing Services (UK) Limited. The filter we use is not a standard water filter, such as the ones you might find in a Britta

system – it's an antibacterial filter. We have independently validated the removal of bacteria that may be present in water, and we have done this test in extreme circumstances, dosing the water with significantly higher levels of bacteria than typically found in water supplies, so we can be truly confident of the filter efficiency. Validation was carried out by Intertek Testing Services (UK) Limited'.

We cannot however assess the evidence to see if these claims are true.

Unpublished university based research which investigated the efficacy and temperature profile of the Tommee Tippee Perfect Prep™ Machine using PIF inoculated with known amounts of *Cronobacter sakazakii* has suggested that whilst the machine hot shot of water onto a small volume of powder was able to eradicate more than 95% of the bacteria, it failed to reduce their numbers to an undetectable level. Whilst the machine produced water for the "hot shot" at a temperature higher than the 70ºC stipulated in current guidelines, the temperature fell to around 60ºC after 2 minutes. Furthermore, when PIF was added at 30, 60 and 90 seconds after the "hot shot" - the temperatures in the bottle were only maintained for around five seconds before they fell again to between 52.5°C and 55.5ºC.

This research showed that dependent on when the PIF is added, the water temperature may be too low to effectively eradicate all bacteria present. The volume of the initial hot shot of water used for a four ounce feed is about one fluid ounce, and it is questionable as to whether this small volume of water can adequately make contact at the right temperature with the amount of PIF added. The research suggests that this volume of water is insufficient to maintain a temperature of greater than 70ºC for the duration of the two minute window recommended for the addition of PIF. This data has not been published in a peer-reviewed journal and therefore can only be considered as contributory evidence at the present time[1].

The Food Standards agency made the following statement when asked about the safety of these formula machines in 2014:

'The issues we have with it are, although it states it dispenses a 'hot shot' at 70C to kill bacteria that potentially could be in the powder, the reality (if you watch the TT advert) is that this amount of hot water used is very small, and once this is dispensed into a cold bottle/cold powder the heat will be quickly lost (more so than when preparing a full bottle with cooled, boiled water to >70C), so we would be interested to see whether TT have done any validation to see what temperatures the hot shot/powder combo actually reaches (and whether this is enough to destroy any bacteria).The other issue, is that the rest of the bottle is then topped up with cold water, which TT state is filtered to remove impurities. Again we would be interested to know whether it has been validated that the TT filter removes potential bacteria in the tap water (as this won't previously have been boiled).
At present the Food Standards Agency would still advocate the use of our Best

[1] Personal communication with First Steps Nutrition Trust

Practice Guidance, to use cooled, boiled water at >70C to make up infant formula'.

(Email communication between Francesca Entwhistle (UNICEF) and Lorna Rowswell at FSA. February 2014).

We have asked FSA to confirm this remains their opinion in 2016 but despite several attempts by us and others, FSA have failed to respond. The Department of Health guidance on formula feeding does not cover the use of formula making machines.

The convenience of this type of formula preparation machine is questionable as users are still required to sterilise all feeding equipment and wash surfaces and hands before preparation, and accurately measure and add the PIF to the feeds. There are also maintenance issues to address such as changing filters and running de-scaling cycles - which cost both time and money. The only benefit to parents appears to be the time saving associated with not having to wait after water boiled in a kettle cools (for no more than 30 minutes so that it remains >70°C) before the milk powder can be added. If boiling water is kept in a full 500ml vacuum flask, the water will remain above 70°C for about 3 hours. A 1litre vacuum flask filled with boiling water of water will still contain water at above 70°C for at least 6 hours, and offers a much simpler and cheaper solution for some families (see the statement on using vacuum flasks at www.firststepsnutrition.org).

First Steps Nutrition Trust therefore believes that **there remains insufficient evidence that these machines are safe in the preparation of powdered infant formula**, and recommend that families and carers use cooled, boiled water at >70^{o}C to make up powdered infant formula, as recommended by the Food Standards Agency and the Department of Health.