Fiona Diskin
Dr. Kenny Smith
WRIT 159A
23 January 2025

Is Farming That Fishy After All?

These days, the grocery store has become a hot spot for controversy. And no, it's not because of the 15 item maximum at self checkout. Words like non-GMO, organic, free range, reduced fat, and so much more have dominated our conversations around food. Similarly, a new set of terms has entered the fish market: wild versus farmed. More farmed fish in the supermarket is a result of a growing aquaculture industry, and overfishing that has decimated many fish stocks. How does one choose between the two and are there distinct differences? According to social media, the overwhelming narrative is down with farmed salmon up with wild! A viral TikTok video titled "Common Health Food is Toxic" makes various claims about farmed salmon. The video, which garnered 2.6 million views, asserts that farmed salmon is less healthy than wild, lighter coloring is due to disease, added coloring is made of artificial dyes, the fish are "covered in pesticides" and that the entire practice is inhumane. The creator ends with "You should NEVER buy farmed salmon." If consumers are focused on providing healthy food for themselves and their families, which of these are real concerns? Unfortunately videos like these do not tell the full story, and misconceptions about farmed salmon's health, taste, color, safety and sustainability are governing what we put on our plates.

With a constant stream of information regarding what is most nutritious, the health of farmed salmon deserves a thoughtful conversation. Almost 80% of shoppers look to the nutrition facts label when making their decisions (6). Fish is an essential supplier of omega-3-fatty acids, including Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA). Omega-3s are important for cardiovascular health, reducing inflammation, strengthening the intestinal microbiome, neuroprotection, and more— a nutritionist's dream. These polyunsaturated omega-3-fatty acids are found at very high levels in both wild and farmed fish. Who has more? The answer varies with type of salmon and what they are being fed. To address a major concern, there is farmed salmon that is lower in these omega-3s….however, there is also a large portion that is *higher* in omega-3s. The diet of wild salmon is composed of smaller fish, plankton, algae, and the diet of farmed fish depends on what feed they are given. Who knew fish food would be so controversial? In the past, most salmon feed was comprised of marine ingredients, including fish feed and fish oil (3), but due to shortages and stress on anchovy stocks, these ingredients have become costly and unreliable (3). In the past ten years there has been massive innovations in feed ingredients, with many farmers switching to vegetable oil based feeds— these have been rigorously tested and are main substituents of feed in both Scotland and Norway (4).

Is it all about what they eat? A lot of it— yes, but there are other things to consider. A study out of Scottish retail outlets in 2013 found that although wild salmon had higher concentrations of EPA and DHA, "farmed salmon products generally delivered a higher dose of EPA and DHA compared to the wild salmon products" because of their higher fat content (3). A 2020 study comparing the salmon options available for Canadian consumers, found that despite changes in feed, "farmed Atlantic salmon still have greater essential fatty acid values, by 79%, than wild salmon" (2). Other conversations around farmed salmon have to do with omega-6 fatty

acids, which are higher in farmed salmon. The widespread notion is that omega-6 increases inflammation. Why is this? Linoleaic acid, one of the most common omega-6 fatty acids, can be converted by the body into arachidonic acid, which can cause inflammation, blood clots, and other effects. However, since the human body is incredibly intuitive, arachidonic acid can also be used to *reduce* inflammation and *fight* blood clots (7). Omega-6 is a healthy fat, important for lowering cholesterol and "improving the body's sensitivity to insulin" (7). At the end of the day almost all salmon, whether wild or farmed, exceeds the 250mg/day recommendation for DHA and EPA, delivering on average *100 grams*— so no need to sweat it! In fact, one study found that wild pacific salmon was the only one that did not supply the necessary omega 3, due to its high protein low fat composition (2).

Does disease really make salmon gray and are they fed artificial dyes? Despite reports across instagram, wellness blogs, and wild fishery websites, these claims are vehemently false. Wild salmon appears orangish pink due to the consumption of crustaceans with naturally occurring carotenoids. "Salmon get their color the same way flamingos do—white salmon exist in the wild and are just as healthy," says Dr. Halley Froehlich, an aquaculture researcher at University of California, Santa Barbara. The carotenoid most responsible is naturally occurring astaxanthin— currently administered as a supplement for humans to help fight cancer and prevent inflammation (9). In talking with Dr. Froehlich, she said "FDA labeling was not built for aquaculture. Labels express no nuance between injections and naturally occurring proteins like carotenoids." Farmed salmon feed includes astaxanthin protein to give them their desired signature color. However, this astaxanthin is sometimes synthetically made, and not much research has been done on the topic. There have been no reports of negative impacts of synthetic astaxanthin, and it is approved by the FDA and EU for animal feed. Dr Froehlich says bio-synthetic astaxanthin is an innovation that will promote sustainability: "To make natural supplements, you have to fish more out of the environment, and that takes away a food source from other marine organisms."

Are farmed salmon really covered in antibiotics, hormones, and pesticides? Growth hormones are *never* used in salmon farming (10). Antibiotic resistance is a real threat, so it is important to consider the impacts that mismanagement can have the the environment. Thankfully, antibiotics are used as a last resort to prevent disease in fish farms, do not decrease consumption safety, and are heavily monitored by the FDA and US EPA (10). Farmed fish that are certified organic, do not use any antibiotics (10). Antibiotic resistance is a real threat, so it is important to consider the impacts that mismanagement can have the the environment. Other concerns about mercury and poly chlorinated biphenyls (PCBs) also dominate the conversation. PCBs can be naturally occurring or human caused and are found both in wild salmon and farmed salmon. Does one have more than the other? A study out of Norway found "PCB concentrations in wild salmon were higher than in the farmed fish" (12). The truth is, the concentrations are so small in all kinds of salmon, it is not a threat to safety. In fact, over 90% of the PCBs in the American diet are not from seafood at all(10). Isn't that fishy? What about taste? ~~This might be easier to clear up.~~ While many say they prefer the taste of wild salmon, blind taste panels show that sometimes people prefer farmed salmon and others wild salmon (10). In another taste test, when participants were given labels for their samples, they preferred wild fish, but when information was not provided, they preferred farmed fish (11).

According to the same viral TikTok video, farmed salmon are extensively diseased and overcrowded. Other concerns about environmental safety also populate the internet. When it comes to sustainability, the proof is in….the management style. Similar to how wild fishing can be both environmentally friendly and unsustainable, farmed salmon follows suit. Since the aquaculture sector is so large let's focus in on two cases of aquaculture management— one being widely effective, sustainable, and safe, and the other posing a potential threat to the environment.

Chile, the second largest producer of farmed salmon in the world, produces various kinds of salmon including Oho and Atlantic (13). According to the Monterey Bay's Seafood Watch, salmon produced in the Magallanes region is considered a "good option", and regards other farmed fish in Chile as a no go (14). There are several environmental and welfare concerns when it comes to Chile's aquaculture: eutrophication, disease, antibiotics, pesticides, escapes, and over-packing. Salmon are anadramous, this means they begin life in freshwater, mature in saltwater, and move back to freshwater to spawn and, sadly die. During the early stages of salmon farming, eggs and juveniles are reared in clean freshwater streams. Nestled into the beautiful and diverse Patagonian channels and fjords you'll find bustling open ocean salmon farms. Eutrophication appears to be a key issue— this is when organic matter from uneaten food, waste, and urine enters the surrounding system. Like many things, these systems exist in a delicate balance, a symphony of limiting nutrients, microbial diversity, and predators. This influx of organic matter is leading to low oxygen conditions in 75% of Chilean salmon farms (13). Harmful algal blooms in the region, causing mass salmon mortality, have been linked to eutrophication, but a direct causal link has not been established (13). As mentioned, an overuse of antibiotics can be harmful to the salmon, and surrounding marine environments. "Chile has one of the highest rate of antibiotics use in salmon production, " (13). When certain antibiotics stop working, different ones are used, and the cycle continues. There have been concerns about the carrying capacity of farms, many claiming that they are too crowded, leading to disease outbreaks. Certain pesticides used to treat a common threat, sea lice, have shown high solubility in surrounding water (13), and accidental escapes of hundreds of thousands of fish impose risk on indigenous species. Chile has a lot of work to do in order to preserve their distinct Patagonia landscape and waters.

On the other hand, many are running an impressive industry. New Zealand has exhibited that proper management, sustainable outcomes, and economic success are achievable. New Zealand rears multiple species of salmon, but has dominated the production of Chinook Salmon. Chinook, also known as king salmon, are large and in charge. The management around them is also large, and the New Zealand Ministry for Primary Industries had the most aquaculture data availability of any government sites I encountered (16). Siting of farms is very important for reducing eutrophication and the siting approach in New Zealand considers this. More wave action and currents mean there is less buildup of nutrients per unit area, and can spread over larger distances where the effect is smaller (17). Monterey Bay's Seafood Watch considers their regional council enforcement of habitat effects to be quite "robust" (15). In regards to antibiotics, *none* have ever been used in any NZ salmon farms (15). Intentional introductions of Chinook to support local fisheries, also prevent any negative ecological impacts farmed Chinook escapees from net pens (15). There have been no disease outbreaks, and there are extensive "plans in place to minimize re-infestation of pests

and diseases through surveillance and response actions." (17). New Zealand and Chile represent two of various management styles. Dr. Froehlich says "It's a governance question in the end." Places like the Faroe Islands and Norway also have adaptable well governed aquaculture management. "We have a really good baseline for operations, standards, and impacts, most of it is about following and enforcing the rules," (19). Good management style is not just good for employees, but makes for a very *fabulous* fish.

If this information has done anything, let us hope it makes the next trip to the grocery less stressful and more informed. May it also remind us not to always trust "Holistic Wellness Coaches" on TikTok. The overwhelming consensus is that farmed salmon is not only safe, but just as healthy for you as wild options. In 2023, 733 million people were malnourished, and continued stress on natural resources is set to make this worse (18). While health influencers may decide that farmed fish is inferior, it is the future of feeding billions of people. A main threat to wild salmon is damming rivers, which interrupts the life cycle. Removal requires concessions by the water and agricultural industries, to which Dr. Froehlich says "Good luck!". With less wild salmon available, prices shoot up in the store, and aquaculture helps provide affordable options. All farmed salmon is not created equal, so a combined effort between the consumer and the government is the way to ensure good salmon is on our plate. I'll blow your mind with one more fact; a significant number of wild salmon fisheries rely on hatcheries during their freshwater stage (20), which are, you guessed it…. AQUACULTURE! So, to my wild salmon purists, like wellness coach @holisticnicola, congratulations— you have already had your first "farmed" salmon, and I'm sure it was delicious.

References

1. Organic Tarzan. [@organic_tarzan]. (2023, December 27). *What you need to know about salmon..#farmedsalmon #wildcaughtsalmon* [Video]. TikTok. https://www.tiktok.com/t/ZP8YRWdwu/

2. Stefanie M. Colombo, Xenna Mazal, *Investigation of the nutritional composition of different types of salmon available to Canadian consumers*, Journal of Agriculture and Food Research,Volume 2, 2020, 100056, ISSN 2666-1543, https://doi.org/10.1016/j.jafr.2020.100056.

3. C. Jonathan Shepherd, Oscar Monroig, Douglas R. Tocher, *Future availability of raw materials for salmon feeds and supply chain implications: The case of Scottish farmed salmon,* Aquaculture, Volume 467, 2017, Pages 49-62, ISSN 0044-8486, https://doi.org/10.1016/j.aquaculture.2016.08.021.

4. Nini H. Sissener, Raul K. Suarez, Hans H. Hoppeler; *Are we what we eat? Changes to the feed fatty acid composition of farmed salmon and its effects through the food chain. J Exp Biol* 7 March 2018; 221 (Suppl_1): jeb161521. doi: https://doi.org/10.1242/jeb.161521

5. Jiali Chen, Muthukumaran Jayachandran, Weibin Bai, Baojun Xu. *A critical review on the health benefits of fish consumption and its bioactive constituents.* Food Chemistry, Volume 369, 2022, 130874, ISSN 0308-8146, https://doi.org/10.1016/j.foodchem.2021.130874.

6. Restrepo, Brandon J., (2023, July 20). *Nearly 80 percent of U.S. adults used Nutrition Facts panel on food labels in buying decisions.* US Department of Agriculture, Economic Research Service. https://www.ers.usda.gov/data-products/charts-of-note/chart-detail?chartId=106957

7. Harvard Health Publishing. (2019, August 20). *No need to avoid healthy omega-6 fats. Harvard Medical School.* https://www.health.harvard.edu/newsletter_article/no-need-to-avoid-healthy-omega-6-fats

8. Stachowiak, B., & Szulc, P. (2021). Astaxanthin for the Food Industry. *Molecules (Basel, Switzerland)*, *26*(9), 2666. https://doi.org/10.3390/molecules26092666

9. Thu Thi Minh Vo, Trong Duc Tran, Gianluca Amoroso, Tomer Ventura, Abigail Elizur, *Analysis of carotenoids and fatty acid compositions in Atlantic salmon exposed to elevated temperatures and displaying flesh color loss,* Food Chemistry, Volume 417, 2023, 135867,ISSN 0308-8146, https://doi.org/10.1016/j.foodchem.2023.135867.

10. Tom, P., Olin, P., (May 2010). *Farmed Or Wild? Both Types Of Salmon Taste Good And Are Good For You.* Oregon State University. https://seafood.oregonstate.edu/sites/agscid7/files/snic/farmed-or-wild-both-types-of-salmon-taste-good-and-are-good-for-you.pdf

11. Anna Claret, Luis Guerrero, Irene Gartzia, Maruxa Garcia-Quiroga, Rafael Ginés,

Does information affect consumer liking of farmed and wild fish?, Aquaculture, Volume 454, 2016, Pages 157-162, ISSN 0044-8486, https://doi.org/10.1016/j.aquaculture.2015.12.024.

12. Jensen, I. J., Eilertsen, K. E., Otnæs, C. H. A., Mæhre, H. K., & Elvevoll, E. O. (2020). An update on the content of fatty acids, dioxins, PCBs and heavy metals in farmed, escaped and wild Atlantic salmon (Salmo salar L.) in Norway. *Foods*, *9*(12), 1901.

13. Quiñones, R. A., Fuentes, M., Montes, R. M., Soto, D., & León-Muñoz, J. (2019). Environmental issues in Chilean salmon farming: a review. *Reviews in aquaculture*, *11*(2), 375-402.

14. *Search sustainable seafood recommendations by Seafood Watch*. (n.d.). https://www.seafoodwatch.org/recommendations/search?query=%3Aspecies%3BSalmon%3Abuy%3BBlue

15. Monterey Bay Aquarium Seafood Watch. (2020 January 13). *Chinook Salmon, New Zealand: Marine and freshwater net pens.* Monterey Bay Aquarium. https://www.seafoodwatch.org/globalassets/sfw-data-blocks/reports/s/mba_seafoodwatch_chinook_salmon_newzealand_report.pdf

16. Ministry for Primary Industries. (2023, April 12). *Sustainable aquaculture | NZ Government*. Sustainable Aquaculture | NZ Government. https://www.mpi.govt.nz/fishing-aquaculture/aquaculture-fish-and-shellfish-farming/sustainable-aquaculture/#:~:text=Aquaculture%20in%20New%20Zealand,King/Chinook%20salmon.

17. Ministry for Primary Industries. (2013 August). *Overview of Ecological Effects of Aquaculture.* https://www.mpi.govt.nz/dmsdocument/4300-Overview-of-ecological-effects-of-Aquaculture

18. Fu, H., Shetty, S., Carmichael, Z., & Andree, B. (2025, January 27). Five alarming statistics on global hunger. *World Bank Blogs*. https://blogs.worldbank.org/en/opendata/five-alarming-statistics-on-global-hunger

19. Personal interview with Dr. Halley Froehlich on January 31st.

20. Raincoast Conservation Foundation. (2024, December 13). *Hatcheries: good intentions, bad outcomes | Raincoast*. Raincoast. https://www.raincoast.org/2024/04/hatcheries-good-intentions-bad-outcomes/#:~:text=Currently,%20there%20are%20at%20least,the%20rise,%20and%20dramatically%20so.

Fiona Diskin
Kenny Smith
WRIT 159A
19 February 2025

Born Out of Love…And A Test Tube

For thousands of years, human beings were all conceived in the exact same way. A little bit of this, a little bit of that, and one lucky sperm met one lucky egg. They honeymooned in the uterine wall and 9 months later out came a miracle—a baby. Without sex, there would be no Queen Elizabeth, no Sir Isaac Newton, no human race! For many couples, a biological baby was out of the question. Infertility crushed the dreams of a child, while single women and same sex couples were forced to accept it wasn't in the cards. But that's the thing about the status quo, it changes, even for the basics of human life. Who could believe that human life could be made in a test tube?! Well… a few did: Dr. Patrick Steptoe, Dr. Robert Edwards, and a loving couple from Bristol, England, John and Lesley Brown. In 1978, the birth of their test tube baby, Louise Joy Brown, would change the world forever.

A young John and Lesley Brown met on the docks by the sea, and six years later they were married. While the two cared for a child from John's previous marriage, they longed to have a baby of their own. Lesley was eventually diagnosed with blocked fallopian tubes, a leading cause of infertility, where a fluid obstruction prevents the egg and sperm from meeting[3]. Lesley underwent surgery to repair her fallopian tubes, as microsurgical procedures were becoming more common during the 1970s[4]. Unfortunately for the Browns, the surgery was not successful. After more than a decade of trying, the couple was left distraught and drained…until a glimmer of hope appeared in a referral to Dr. Patrick Steptoe— nearly 200 miles away in Oldham, England [2].

Dr. Patrick Steptoe is considered a hero in the field of obstetrics, but prior to his IVF fame he was also a war hero. During the onset of WWII, "he joined the Royal Navy Volunteer Reserve as a Surgeon.[5]" He was taken as a prisoner of war in Italy and put into solitary confinement after helping fellow prisoners escape. Once the war was over he returned to England and wasted no time specializing in obstetrics and gynecology. Before choosing medicine, Steptoe considered becoming a musician, but lucky for us he waved goodbye to that dream [5]. His specialty become laparoscopic gynecology— minimally invasive surgical procedures that require small incisions, and insertion of a long tube, with a camera on the end[7].

---

[2] Dow, K. (2018). 'Now she's just an ordinary baby': The birth of IVF in the British press. *Sociology*, *53*(2), 314–329. https://doi.org/10.1177/0038038518757953

[3] Ambildhuke, K., Pajai, S., Chimegave, A., Mundhada, R., & Kabra, P. (2022). A Review of Tubal Factors Affecting Fertility and its Management. *Cureus*, *14*(11), e30990. https://doi.org/10.7759/cureus.30990

[4] Sotrel G. (2009). Is surgical repair of the fallopian tubes ever appropriate?. *Reviews in obstetrics & gynecology*, *2*(3), 176–185.

[5] Brinsden, Peter. (2009). Thirty years of IVF: The legacy of Patrick Steptoe and Robert Edwards. Human fertility (Cambridge, England). 12. 137-43. 10.1080/14647270903176773.

[7] *Laparoscopic gynecological Surgery*. (n.d.). Baylor College of Medicine. https://www.bcm.edu/healthcare/specialties/obstetrics-and-gynecology/ob-gyn-procedures/laparoscopic-gynecological-surgery

According to various reports, his colleagues thought it would never "catch on"[5]. Well, the joke's on them. Laparoscopic surgery was a game changer for female reproductive procedures, and full hysterectomies can now be done through just four small incisions [6]. Dr. Steptoe became particularly interested in oocyte identification. Oocytes are female germ cells that can eventually mature into an egg cell; choosing oocytes is essential for successful IVF treatment. Dr. Robert Edwards, his future partner, also had an interest in oocyte retrieval. Edwards, also a veteran, ~~met his wife during medical school with whom he published a series of papers. Edwards~~ was highly interested *in vitro* fertilization [5].The literal translation of in vitro is "in glass", or in a test tube— a fitting image for groundbreaking scientific discovery. After Edwards attended a laparoscopy lecture by Steptoe, he reached out to him suggesting collaboration— a partnership that would go down in history [5].

Infertility was not just a battle for the Browns, but for Steptoe and Edwards. They continuously improved their skills, performing oocyte recovery, studying the sperm, and developing a deeper understanding of the requirements for a successful fertilization. They also worked alongside Jean Purdy, a female scientist often forgotten for her important contributions to the success of IVF. She was the first to see an embryo divide outside of the body, which had proven unsuccessful until then. Their first human embryo transfers began in 1972, and none of their first 40 patients became pregnant [5]. The truth is, the innate way in which humans come to be is not simple at all— it requires near perfect conditions, and many of these things were misunderstood before Edwards and Steptoe. In 1976, a breakthrough, when their first patient tested positive for pregnancy following preimplantation of the fertilized embryo. This first success came after a single blastocyst transfer; a blastocyst is the small cluster of cells a couple of days after successful fertilization and in this case only one was transferred back into the uterus. This is not always favored due to low pregnancy rate, but reduces the risks of twins, triplets, quadruplets (ouch) etc. [8]. Unfortunately, despite this new success, it was an ectopic pregnancy, when a fertilized egg implants itself outside of the uterus. Setbacks plagued the gynecological duo and a determined Lesley and John Brown continued to seek new avenues. It was later in 1976 that the Browns made their journey to see Dr. Steptoe.

Lesley Brown was a very ordinary woman, who was about to take part in one of the most extraordinary accomplishments in medical history. She would be the first of millions of women to give birth to a healthy baby, who was created in a test tube and wanted so fiercely. But before that, real trials had to be overcome. A shy Lesley was known for being introverted, caring, and determined ~~nature~~[2] — one simply had to be to undergo 102 failed embryo transfers [5]. There was no injection of hormones to induce the growth of oocytes, so selection was crucial . Today a hormone called human menopausal gonadotropin (hMG) is injected prior to egg retrieval. It led

---

2 Dow, K. (2018).
5 Brinsden, Peter. (2009).
6 *Common Gynecologic Procedures | Boston Medical Center*. (n.d.). Boston Medical Center. https://www.bmc.org/gynecology/common-procedures
8 David K Gardner, Eric Surrey, Debra Minjarez, Annette Leitz, John Stevens, William B Schoolcraft, Single blastocyst transfer: a prospective randomized trial, Fertility and Sterility, Volume 81, Issue 3, 2004, Pages 551-555, ISSN 0015-0282, https://doi.org/10.1016/j.fertnstert.2003.07.023.

to greater oocyte retrieval, and IVF pregnancy rates of 30% by 1983[14]. On November 10th, 1977 an oocyte was laparoscopically recovered, and this was one lucky egg. The retrieval process is the most invasive part of the procedure, and was done under general anesthesia. The egg was then transferred to a petri dish, where it was incubated with sperm at 37°C, and a culture media composed of sugars, amino acids, water, saline and most likely a serum composed of human fallopian tube fluid [10]. After 2 and a half days, and 3 cell divisions, the 8 cell blastocyst was re-implanted in Lesley Brown's uterus [9]. This was done using a catheter, and is a similar experience to getting a pap smear— not totally awful, but I certainly wouldn't want to do that 102 times! Overjoyed, the team had successfully gotten Lesley Brown pregnant. While a difficult pregnancy awaited, the Browns were thrust into the media spotlight.

Their story was covered in dozens of newspapers both inside and outside of the United Kingdom, but a private agreement allowed the *Daily Mail* access to the main sources[2]. The portrayal of the Browns was not to be taken lightly; the attitudes surrounding IVF relied on generating sympathy towards family struggles like infertility. At the time the *Daily Mail* had a more conservative viewership, focused on traditional family values[2]. The Browns were an ordinary working class couple, deemed worthy by the public and the press to undergo this groundbreaking experiment. The depiction of Lesley as an introverted loving housewife and mother was true, but deflated the quiet quest for autonomy that her journey highlights. Her courage was truly unmatched. However there was much to be said about how this approach normalized IVF as something powerful not something evil. Among intense media attention, there were growing concerns about the safety of Lesley and the fetus. This created great stakes for not just the Browns, but Edwards and Steptoe. Dr. Steptoe hid Lesley in his car and drove to his mother's house, where Lesley stayed for a period of time safe from the press [11].

Getting pregnant was only the first hurdle, but each small victory was one step closer to a medical revolution. During week 16 of her pregnancy, the doctors performed an amniocentesis. This procedure, in which amniotic fluid is removed from the amniotic sac for testing, found that the fetus had no chromosome abnormalities, and normal protein levels[9]. Thanks to IVF, modern parents don't always have to wait till 15 weeks for this test— fatal and dangerous abnormalities can be detected when the embryo is just 6 to 10 cells [14]. Lesley's ultrasounds showed that after week thirty, Louise's growth began to slow, and placenta and blood testing showed lower than

---

2 Dow, K. (2018).

9 P.C. Steptoe, R.G. Edwards, BIRTH AFTER THE REIMPLANTATION OF A HUMAN EMBRYO, The Lancet, Volume 312, Issue 8085, 1978, Page 366, ISSN 0140-6736, https://doi.org/10.1016/S0140-6736(78)92957-4.

10 Eskew, A. M., & Jungheim, E. S. (2017). A History of Developments to Improve *in vitro* Fertilization. *Missouri medicine*, *114*(3), 156–159.

11 BBC News. (2012, June 20). *First test tube baby mother Lesley Brown dies*. https://www.bbc.com/news/uk-england-bristol-18524232

14 Wang, J., & Sauer, M. V. (2006). In vitro fertilization (IVF): a review of 3 decades of clinical innovation and technological advancement. *Therapeutics and clinical risk management*, *2*(4), 355–364.

normal levels. This last trimester was critical stage and Lesley was diagnosed with preeclampsia [9]. Preeclampsia is a disorder associated with hypertension and swelling, and can affect both mother and baby [12]. Luckily, this could be managed with medication and scheduled cesarean section. Like her mother, Louise exhibited determination during the end of the pregnancy, growing significantly in the last 10 days. Continued commotion from the press surrounded Oldham General Hospital; Lesley recounted fake bomb threats [11] and fake cleaners, in order to gain access to her room . As if being pregnant isn't stressful enough! A long and chaotic 38 weeks and 5 days after implantation [9], the day finally came.

"Happy Birthday Louise!" could be heard around the world on July 25th 1978. Blonde, plump, beautiful, and most of all.. healthy. After initial examinations, everyone could breath a great and exasperated sigh of relief. Just six weeks after she was born, a documentary aired on the only commercial television channel in the UK, titled "To Mrs. Brown…A Daughter"[13]. The producer of the film, Peter Williams, came into their home and documented some of the first moments of Louise's life. Scenes of Louise lying on a mat, being cradled by her mother, and naked swaddled in a blanket told the public exactly what they wanted: that she was *normal*. And rather adorable at that. Birthday cards, prayers, and messages flooded in as the Browns returned to their home life, ordinary and filled with love.

The pregnancy and delivery were incredibly well documented— this was not just a matter of personal joy but rigorous medical research. Steptoe and Edwards had to prove without a doubt that Louise was conceived in a "test tube". The birth was filmed and many of the laparoscopic images from before and during pregnancy were shared in the documentary. Many doctors offered skepticism, citing that if Mrs. Brown's fallopian tubes were in tact, they could not be 100% sure in their feat [5].Lesley's fallopian tubes were barely in tact when she was referred to Dr. Steptoe, and he removed them, once again laparoscopically, to gain better access to her ovaries. After the birth and certification, the duo was able to comment on their success for the first time. It marked a huge turning point for assisted reproductive technologies (ART), and a demystification of the female reproductive system. One documentary critic from the Guardian commented, "the TV pictures through a medical telescope into the womb are new and fascinating"[13].

Life continued for the Browns, and through continued compassionate representation of their family's experience with infertility, they sought to give Louise as normal a life as normal could be. Edwards and Steptoe were not always granted this same compassion. As the understanding of IVF grew, so did the ethical conversations surrounding the controversial

---

2 Dow, K. (2018).
5 Brinsden, Peter. (2009).
9 P.C. Steptoe, R.G. Edwards
11 BBC News. (2012, June 20).
12 Time. (1978, August 7). Medicine: Test-Tube Baby: It's a girl. *TIME*. https://time.com/archive/6881341/medicine-test-tube-baby-its-a-girl/
13 Dow K. (2019). Looking into the Test Tube: The Birth of IVF on British Television. *Medical history*, *63*(2), 189–208. https://doi.org/10.1017/mdh.2019.6

procedure. Although in Louise's case only one egg was fertilized, in many cases there are multiple. This brought up a huge pro-life argument for the Catholic Church, and skepticism under a growing conservative movement. While the Browns were supported by the whole of England, the conservative media, and by Margaret Thatcher herself [2], the scientists were subjected to criticism. Dr. James Watson, famous for stealing the DNA discoveries of coworker Rosalind Franklin, called their work "dabbling with infanticide"[5]. After the birth of the second IVF baby, Alastair Macdonald, Steptoe and Edwards lost funding sources for their research and to set up an IVF clinic [5]. They managed to do this privately, and established Bourn Hall Clinic in Cambridge with the help of their collaborator Jean Purdy; thousands of healthy children were born out of this clinic's work.

Meanwhile, the Brown's continued life with their two daughters, speckled with media appearances around the globe. At four months old Louise and her parents were whisked to Canada, Japan, and Florida for IVF related appearances, followed by years in Paris, the United States and Brazil [13]. In 1979 a book was published chronicling Louise's story, titled "Our Miracle Called Louise". In 1982, Lesley had a second daughter through IVF named Natalie, who became the first person born through IVF to have children of their own [1]. The Browns remained involved with the Bourn Hall Clinic, who celebrated milestones alongside the family. Patrick Steptoe died in 1988, almost 10 years after Louise's miracle birth [19]. In his obituary, written by friend and colleague Robert Edwards, he describes his steadfast determination and feminist upbringing [19]. Mrs. Steptoe's advocation for women's rights most certainly rubbed off on her son, who enhanced reproductive freedoms for women around the globe.

Now 46, Louise Brown lives with her husband in Bristol, where her parents raised her. She has two naturally conceived sons; a testament to IVF's truest success. Cameron and Aiden Patrick Robert (named after Steptoe and Edwards) [20] are two of Lesley Brown's five grandchildren. Louise continues to advocate for access to IVF around the world, and in 2015 a book in Louise's voice was released, titled "Louise Brown: My Life as the World's First Test Tube Baby" [2]. She has dozens of interviews detailing her childhood experience, and honoring her brave parents, John and Lesley, who died in 2005 and 2012 respectively. Many have asked Louise if she was bullied, ridiculed, or singled out for her special origins, but she always felt like an ordinary child, who just happened to come from an extraordinary embryo. Louise said, "People born through IVF are just like everyone else – some are nice, some are not; some are clever, some not so clever." [2] When Louise was in her first sex education class, she opened up the text book to a picture of herself, a blue eyed baby with her name in a caption below [20].

---

1 *Papers of Lesley Brown, the first mother to conceive by IVF*. (n.d.). Bristol Archives Online Catalogue. https://archives.bristol.gov.uk/records/45827

2 Dow, K. (2018).

5 Brinsden, Peter. (2009).

13 Dow K. (2019).

19 Edwards Robert Geoffrey 1996Patrick Christopher Steptoe, C. B. E., 9 June 1913 - 22 March 1988Biogr. Mems Fell. R. Soc.**42**433–452

20 CBS Sunday Morning. (2018, September 15). *Louise Brown on growing up the first test tube baby* [Video]. YouTube. https://www.youtube.com/watch?v=YeQeNoKlcfc

Every new chapter in Louise's life accompanied a new chapter in assisted reproductive technologies around the world.

More improvements have turned Louise's single page in a textbook into entire libraries. The ability to cryopreserve eggs, embryos, and sperm has allowed for many women to conceive later in life, on their own timeline. IVF has allowed for families to conceive without fear of dangerous hereditary genes and opened up a new line of research with embryonic stem cells. With greater improvements, ethical and religious debate has not subsided, but the opinions of the general public remain overwhelmingly positive. Today, over 12 million people have been born from in vitro fertilization technologies [17]. That's millions of parents, whose dream to have a child was granted through a scientific miracle. Infertility has affected so many people, and for Lesley Brown, the yearning for a child caused a deep depression: "You don't feel normal. You feel you're not a real woman ." [2] Still, her faith was relentless, "You ought to accept what they [doctors] say but something inside me all the time was telling me they were wrong." [2] Lesley and John's determination emphasizes the importance of pushing science forward. Through a mother's love, a powerful partnership, exhaustive research, and a little bit of luck…the Browns, Edwards, and Steptoe tackled infertility giving birth to a whole new status quo. Louise Joy Brown is aptly named, as the name Louise means "warrior" [21]— the success of her birth led the battle against infertility and delivered *joy* to millions of families across the world.

---

2 Dow, K. (2018).

17 ClinicalMedicine (2023). The current status of IVF: are we putting the needs of the individual first?. *EClinicalMedicine*, *65*, 102343. https://doi.org/10.1016/j.eclinm.2023.102343

[21] Whelehan, A. (2025, March 7). *Louise*. Baby Name Meaning, Origin and Popularity. https://www.thebump.com/b/louise-baby-name